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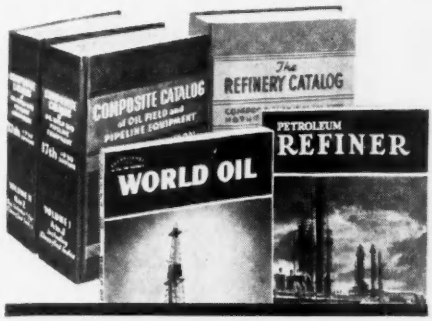

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FOREWORD . . . .

THIS ISSUE OF WORLD OIL, devoted exclusively to global operations outside the U. S., has been compiled as a convenient reference source for the large and growing number of men interested in knowing world-wide petroleum development trends.

It is the most complete report available anywhere on international drilling, producing, refining and pipe lining trends; all presented in a concise manner with up-to-date maps and statistical data. With the exception of the USSR and some of its satellites, the data presented have been obtained from the best authoritative sources, usually from either the operating companies or the respective government bureaus of each country which are charged with the responsibility of keeping statistical records on petroleum developments. The figures published for countries exerting strict censorship on petroleum developments necessarily are estimated, but have been procured from men in a position to make intelligent analyses of the situation.

A vast amount of data is presented on each country experiencing any oil development, and much effort has been made to present the information in a convenient form. Production data include current production levels, cumulative recovery, number of producing wells, producing depths, producing formations and other pertinent information by individual fields. Drilling information includes number of wells completed in individual fields, footage drilled, and whether they produced oil or gas. Other tables present pertinent information on pipe lines and refineries, including their location and capacities.

Included is the finest and largest collection of up-to-date oil field maps covering areas outside the U. S. These maps show size, shape and location of oil and gas fields, pipe line outlets, and location of refineries in practically every oil producing region of the world.

It would not be possible to publish such a complete report on world oil developments without the wholehearted assistance of government departments, oil companies and interested individuals. For this invaluable cooperation and help we extend our most sincere thanks. Without this assistance the "International Operations Issue" could not maintain its reputation as the finest reference source for information on oil activities outside the U. S.

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WORLD PETROLEUM DEMAND AND SUPPLY

WORLD petroleum demand increased in 1949 an average of 406,900 barrels daily over 1948, and the greatest portion of this increase in consumption occurred in Europe where industrial output is on the upswing. The available world supply was again in excess of consumption for the second straight year; however, the smaller differential between supply and demand as compared with 1948 was not a true picture of the world's ability to produce petroleum. In most cases, voluntary cutbacks in production in the U. S. and Venezuela brought production in balance with demand. These cutbacks were made because Middle East oil output increased markedly.

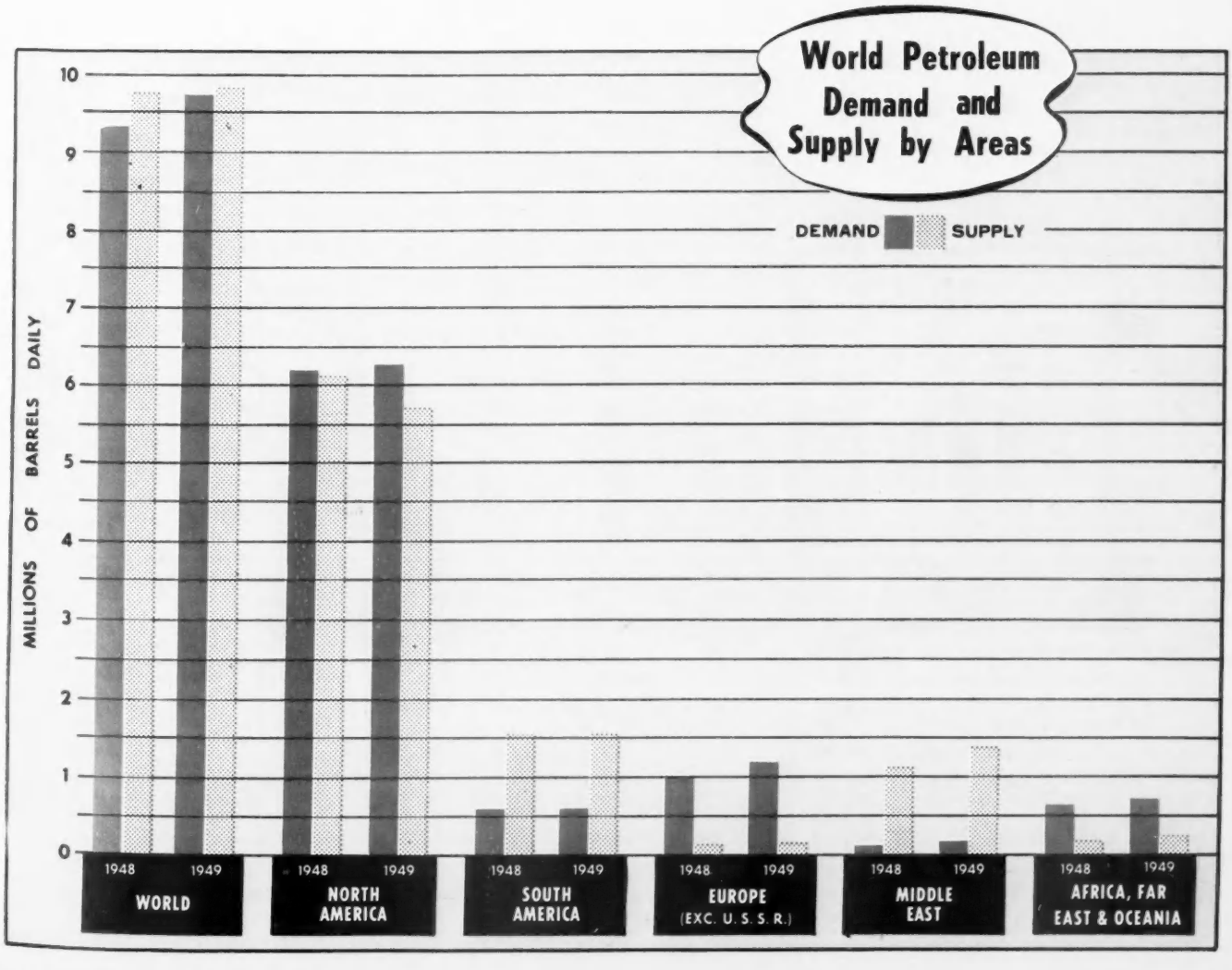
Over-all, the combined world output again set a new record with a daily average for 1949 of 9,820,800 barrels of petroleum (crude, natural gasoline and synthetic products). This represents an increase of 22,800 barrels daily over the 1948 average of 9,798,000 barrels daily, in contrast with a spectacular increase of 12 percent in 1948 over 1947.

The gain in demand was about 18 times greater than the increase in supply, which is fairly indicative of the uneven balance of the two factors in 1948. Consumption increased 4.4 percent over 1948 rates to average 9,747,300 barrels daily. The amount of oil produced in 1949 exceeded the amount consumed by 73,500 barrels daily, whereas in 1948 output had been 457,600 barrels larger than demand.

Supply in 1949 was made up of 9,322,800 barrels of crude and 498,000 barrels of natural gasoline and synthetic products. Thus the production of crude dropped about 22,000 barrels daily from 1948 output and natural gasoline-synthetic products increased about 44,000 barrels daily. A large portion of the increase in natural gasoline-synthetic products was recorded in U. S.

During 1949 the U. S. dropped out of the column of countries or areas which produced more oil than they consumed. This condition is indicative of the enlarged imports and reduced exports. During the year U. S. imports increased by about 122,000 barrels daily over 1948.

Only two major geographical regions of the world produced more petroleum than they consumed in 1949 and the shortage areas are still dependent upon those regions for enough oil to satisfy demand above domestic supply. The Caribbean area of Northern South America and the Middle East group of countries in Asia were the two areas with an excess supply of petroleum. The Caribbean area did not increase its supply noticeably over 1948, but there was a large increase in supply from the Middle East. The U. S., the Caribbean area and the Middle East account for 84 percent of the world's supply of petroleum at present, and together the regions only consume 63 percent of the oil, leaving a surplus supply of 2,120,300 barrels daily for the oil-short countries. It will be noted that the supply and demand for Soviet Russia are shown as being in balance. Actually, the demand for petroleum products would be much higher than indicated if Russia had more sources of supply, but



WORLD PETROLEUM DEMAND AND SUPPLY—Continued

the country has to hold consumption to the narrow limits of supply from its own fields and those of Russia's satellites.

The Caribbean region, comprising the fields of Venezuela, Colombia and Trinidad, was almost surpassed in 1949 as the world's largest surplus petroleum area by the Middle East countries. Where the Caribbean exceeded the Middle East supply by about 330,000 barrels daily in 1948, the differential dropped to about 61,000 barrels daily last year. The Caribbean's daily average supply during 1949 was 1,464,100 barrels while the Middle East recorded 1,402,900 barrels daily. If Venezuela had not cut back production during the early part of the year, because of tightening foreign markets, the Caribbean would have maintained a respectable lead over the Middle East in 1949. It is doubtful now that the Caribbean will ever again surpass the Middle East in supply as the latter area is taking over more and more European markets. The Caribbean still produces 1,251,200 barrels daily more than it consumes. The drop in demand for the area's oil in European markets can well be offset by increased domestic consumption as other basic industries are expanded in South America. By this means, as the region's oil exports fall off, the movement of other products to foreign markets could be increased. Venezuela recognizes this condition and is currently expanding agricultural and manufacturing activities. The Middle East countries, however, cannot plan on a similar shift in economy to any great extent and will have to rely on petroleum as the main exportable commodity.

The Middle East area, including Iran, Iraq, Saudi Arabia, Bahrein, Kuwait and Turkey, now has proved reserves almost equal to the U. S. and Venezuela combined. The production from these countries comes from only a few scattered fields, while much of the remaining area has not yet been explored in any way. Should demand warrant increased exploration, it is difficult to visualize what the total reserves of these countries might be. As an example of the growth of the area in oil output, the Middle East increased its daily production from 690,400 barrels in 1946 to 1,138,000 barrels in 1949. Consequently, oil available for export from the Middle East, after filling domestic needs, increased from 545,000 barrels in 1946, to 671,500 barrels in 1947, to 955,800 barrels in 1948, and to 1,191,100 barrels daily in 1949.

Petroleum Demand and Supply by Areas, 1947-1948-1949

Barrels Per Day

	Domstic Demand	DOMESTIC SUPPLY			Excess Supply Over Demand	Excess Demand Over Supply	PERCENT OF WORLD TOTAL	
		Crude Oil	Natural Gasoline, Etc.	Total			Domestic Demand	Domestic Supply
1949:								
United States	5,792,400	5,041,900	428,500	5,470,400	.....	322,000	59.42	55.70
Other North America	478,200	224,000	8,200	232,200	.....	246,000	4.91	2.36
Total North America	6,270,600	5,265,900	436,700	5,702,600	.....	568,000	64.33	58.06
Caribbean Area	212,900	1,459,200	4,900	1,464,100	1,251,200	.....	2.18	14.91
Other South America	397,500	112,600	5,200	117,800	.....	279,700	4.08	1.20
Total South America	610,400	1,571,800	10,100	1,581,900	971,500	.....	6.26	16.11
Europe (Excluding U. S. S. R.)	1,226,700	150,200	26,000	176,200	.....	1,050,500	12.59	1.79
U. S. S. R.	707,000	685,000	22,000	707,000	.....	.....	7.25	7.20
Africa	236,800	43,500	1,000	44,500	.....	192,300	2.43	0.45
Middle East	211,800	1,402,900	.....	1,402,900	1,191,100	.....	2.17	14.29
Far East and Oceania	484,000	203,500	2,200	205,700	.....	278,300	4.97	2.10
TOTAL WORLD	9,747,300	9,322,800	498,000	9,820,800	73,500	.....	100.00	100.00
1948:								
United States	5,775,100	5,519,600	401,900	5,921,500	146,400	.....	61.83	60.44
Other North America	444,400	192,000	8,300	200,300	.....	244,100	4.76	2.04
Total North America	6,219,500	5,711,600	410,200	6,121,800	.....	97,700	66.59	62.48
Caribbean Area	210,600	1,458,600	3,700	1,462,300	1,251,700	.....	2.25	14.92
Other South America	390,000	112,400	4,800	117,200	.....	272,800	4.18	1.20
Total South America	600,600	1,571,000	8,500	1,579,500	978,900	.....	6.43	16.12
Europe (Excluding U. S. S. R.)	1,069,600	133,900	21,100	155,000	.....	914,600	11.45	1.58
U. S. S. R.	618,000	600,000	12,000	612,000	.....	6,000	6.62	6.25
Africa	212,500	36,000	800	36,800	.....	175,700	2.27	0.38
Middle East	182,200	1,138,000	.....	1,138,000	955,800	.....	1.95	11.61
Far East and Oceania	438,000	153,800	1,100	154,900	.....	283,100	4.69	1.58
TOTAL WORLD	9,340,400	9,344,300	453,700	9,798,000	457,600	.....	100.00	100.00
1947:								
United States	5,449,200	5,085,200	364,000	5,449,200	.....	.....	62.36	62.62
Other North America	487,300	174,500	2,300	176,800	.....	310,500	5.58	2.03
Total North America	5,936,500	5,259,700	366,300	5,626,000	.....	310,500	67.94	64.65
Caribbean Area	181,600	1,314,600	3,800	1,318,400	1,136,800	.....	2.08	15.15
Other South America	262,300	102,700	3,300	106,000	.....	156,300	3.00	1.22
Total South America	443,900	1,417,300	7,100	1,424,400	980,500	.....	5.08	16.37
Europe (Excluding U. S. S. R.)	1,010,600	128,300	33,600	161,900	.....	848,700	11.57	1.86
U. S. S. R.	578,000	543,000	10,000	553,000	.....	25,000	6.62	6.35
Africa	180,300	25,500	1,000	26,500	.....	153,800	2.06	0.30
Middle East	168,800	840,500	.....	840,300	671,500	.....	1.93	9.66
Far East and Oceania	419,500	67,400	3,100	70,500	.....	349,000	4.80	0.81
TOTAL WORLD	8,737,600	8,281,500	421,100	8,702,600	.....	35,000	100.00	100.00

Source: C. J. Bauer, Petroleum Economist. Standard Oil Company (New Jersey).

WORLD CRUDE PRODUCTION

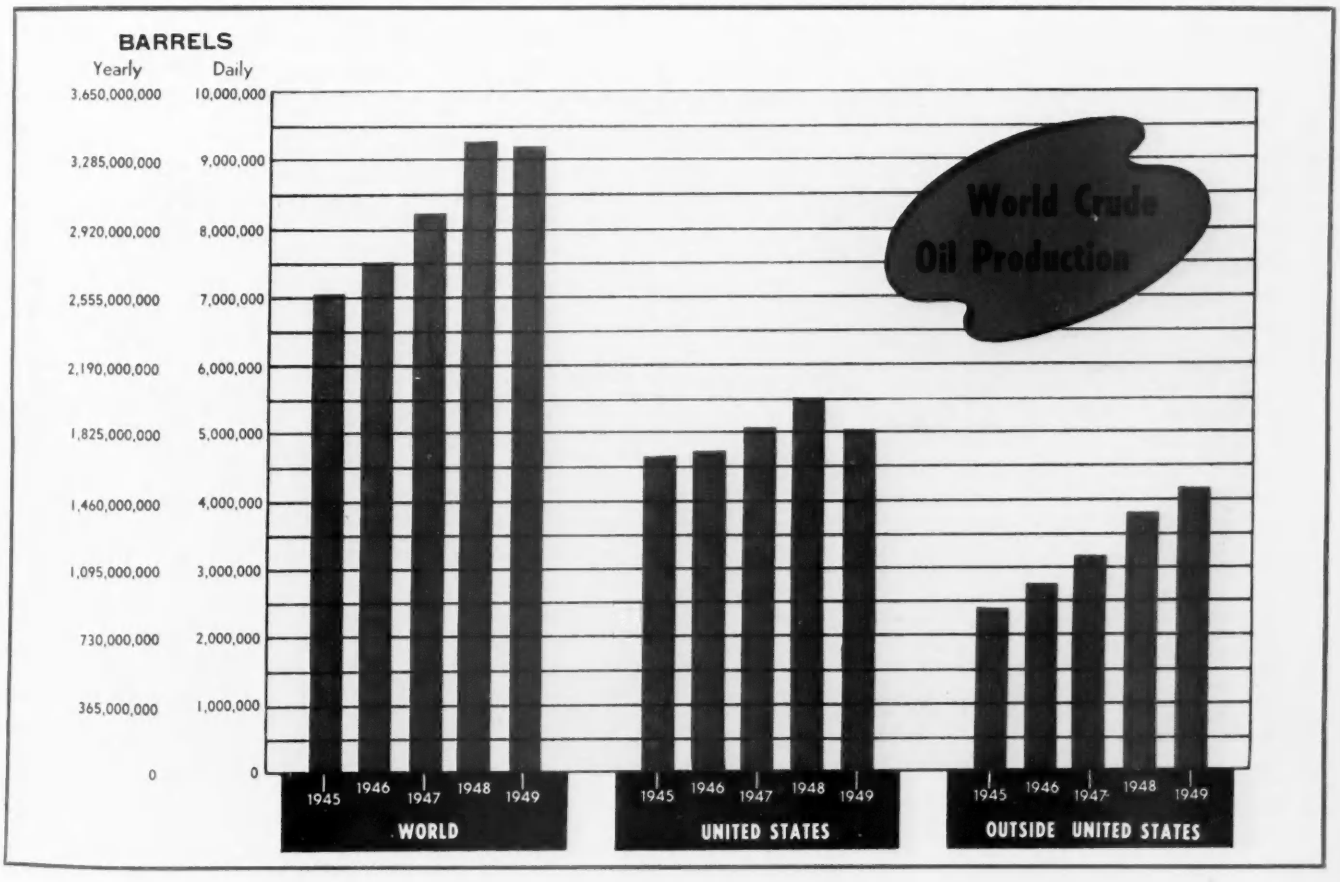
WORLD crude oil production dropped more than 45 million barrels to 3,367,720,000 barrels total in 1949 as compared with 3,412,883,000 barrels in 1948. Despite the drop, 1949 ended with the second highest annual output for the world, being exceeded only by 1948 when tremendous oil surpluses were built up. The U. S., producing 54.65 percent of the world total, accounted for the drop in output by vountarily reducing its production 179,878,000 barrels from the previous year. The U. S. cutback was due primarily to surplus stock on hand at the end of 1948 monopolizing storage facilities, and to a lesser extent to increased imports of oil from foreign areas.

Daily average production during 1949 for the world was 9,226,630 barrels as compared with 9,324,817 barrels daily for 1948. The decrease of 98,187 barrels daily represented only 1.1 percent less than the previous year, although the U. S. alone produced 8.7 percent less oil daily than 1948. The amount dropped by the U. S. was made up by the Middle East, Canada, Colombia, Borneo and Java, with minor gains in other smaller oil producing countries. Venezuela also suffered a drop in output of 14,344,000 barrels during 1949 because decreasing demand for its heavy oil caused voluntary cutbacks in production throughout the country.

The Middle East forged rapidly ahead as a major source of world oil in 1949, increasing its annual output almost 100 million barrels. The cheaper and more accessible Middle East oil is rapidly taking over important European markets and more of this oil will reach those markets as pipe line facilities become available. With proved reserves almost equal to the combined total of the U. S. and Venezuela, the Middle East will be an important world trade factor in a short time. The movement of desert oil into Europe will cause Venezuela and several other South American countries to reshape their economies along broader lines with less emphasis on oil as an export commodity.

Canada forged ahead in 1949 with a 75.3 percent daily increase in output over 1948. Annual production for the Dominion was 21,492,000 barrels last year as compared with 12,295,000 barrels in 1948. Less spectacular, but of utmost importance to the Western Hemisphere, were the gains of 46.5 percent daily in Bolivia, 25.2 percent in Colombia, 5.5 percent in Peru and 4.3 percent in Mexico.

Germany, France and the Netherlands recorded the greatest increases in production in Europe, outside of the U.S.S.R. orbit, in 1949. German oil output went from 4,420,000 barrels in 1948 to 5,827,000 barrels in 1949—or an increase of 32.2



(All Figures in Barrels)

YEAR	WORLD		UNITED STATES		OUTSIDE U.S.A.		YEAR	WORLD		UNITED STATES		OUTSIDE U.S.A.	
	Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average		Annual Total	Daily Average	Annual Total	Daily Average	Annual Total	Daily Average
1938	1,988,041,000	5,466,000	1,214,355,000	3,327,000	773,686,000	2,119,000	1944	2,592,513,000	7,083,400	1,677,904,000	4,584,400	914,609,000	2,498,900
1939	2,086,160,000	5,715,500	1,264,962,000	3,465,600	821,198,000	2,249,900	1945	2,594,957,000	7,109,500	1,713,655,000	4,694,900	881,302,000	2,414,500
1940	2,149,821,000	5,873,800	1,353,214,000	3,367,300	796,607,000	2,176,500	1946	2,745,666,000	7,522,400	1,733,939,000	4,750,500	1,011,727,000	2,771,900
1941	2,220,657,000	6,084,000	1,402,228,000	3,841,700	818,429,000	2,242,300	1947	3,021,666,000	8,278,500	1,856,987,000	5,087,600	1,164,679,000	3,190,900
1942	2,093,098,000	5,734,500	1,402,228,000	3,841,700	706,453,000	1,935,500	1948	3,412,883,000	9,324,800	2,020,185,000	5,519,600	1,392,698,000	3,805,200
1943	2,256,623,000	6,182,500	1,505,613,000	4,125,000	751,010,000	2,057,600	1949	3,367,720,000	9,226,600	1,840,307,000	5,041,900	1,527,413,000	4,184,700

WORLD CRUDE PRODUCTION—Continued

percent. France had an increase of 28.8 percent for the year, going from 362,000 to 465,000 barrels, and the Netherlands had an increase of 25.7 percent, going from 3,444,000 to 4,316,000 barrels. These increases in Western Europe, together with possible pooling of coal and iron interests, will have a direct bearing on the area's economic recovery.

Egypt increased its production 20.3 percent from 13,173,000 barrels in 1948 to 15,808,000 barrels in 1949. Algeria gained minute amounts of production and Morocco increased its output 50.8 percent to 144,000 barrels in 1949. These amounts are insignificant in the world picture at the present time; however, most of the areas of Africa are yet unexplored for oil and the continent will undoubtedly play an increasingly important part in the world-wide search for new oil supplies. France, in fact, is very active in its colonies in North Africa and may be expected to try to supply its own needs from these areas in the future.

Iran is the big producer in the Middle East area with an output of 204,712,000 barrels from 73 wells during 1949. The country produced 190,384,000 barrels in 1948, but neither figure

Trends in World Crude Oil Production, by Countries, and Cumulative Production Through 1949

(Sources: U. S. Bureau of Mines except 1949 from private sources or estimated by WORLD OIL)

CONTINENT and COUNTRY	ANNUAL PRODUCTION (Thousands of Barrels)		DAILY AVERAGE PRODUCTION (Actual Barrels)			YEAR'S PRODUCTION As Percent of World		CUMULATIVE PRODUCTION TO JANUARY 1, 1950 (Thousands of Barrels)*	
	1948	1949	1948	1949	% Diff. '48-'49	1948	1949	Total	As % of World
NORTH AMERICA:									
Canada	12,295	21,492	33,593	58,882	+ 75.3	0.36	0.64	162,630	0.26
Cuba	159	161	434	441	+ 1.6	.....	.....	2,080	.....
Mexico	58,370	60,736	159,481	166,400	+ 4.3	1.71	1.80	2,409,599	3.91
United States	2,020,185	1,840,307	5,519,631	5,041,937	— 8.7	59.19	54.65	38,943,881	63.11
Total North America	2,091,009	1,922,696	5,713,139	5,267,660	— 7.8	61.26	57.09	41,518,190	67.28
SOUTH AMERICA:									
Argentina	23,253	22,590	63,533	61,890	— 2.6	0.68	0.67	434,337	0.70
Bolivia	464	678	1,268	1,858	+ 46.5	0.01	0.02	4,971	0.01
Brazil	143	109	391	299	— 23.5	.....	.....	639	.....
Chile	.....	55	.....	151	.....	.....	.....	55	.....
Colombia	23,743	29,644	64,871	81,216	+ 25.2	0.70	0.88	470,828	0.76
Ecuador	2,611	2,615	7,134	7,164	+ 0.4	0.08	0.08	46,444	0.08
Peru	14,069	14,796	38,440	40,537	+ 5.5	0.41	0.44	386,483	0.63
Trinidad	20,199	20,468	55,188	56,077	+ 1.6	0.59	0.61	392,404	0.63
Venezuela	471,520	457,176	1,288,306	1,252,537	— 2.8	13.82	13.58	4,960,328	8.04
Total South America	556,002	548,131	1,519,131	1,501,729	— 1.1	16.29	16.28	6,696,489	10.85
EUROPE:									
Albania	1,400	1,250	3,825	3,425	— 10.5	0.04	0.04	14,124	0.02
Austria	5,711	7,652	15,604	20,964	+ 34.4	0.17	0.23	59,035	0.10
Czechoslovakia	204	209	557	573	+ 2.9	0.01	0.01	4,350	0.01
France	362	465	989	1,274	+ 28.8	0.01	0.01	14,451	0.02
Germany	4,420	5,827	12,077	15,964	+ 32.2	0.13	0.17	98,561	0.16
Great Britain	323	338	883	926	+ 4.9	0.01	0.01	4,470	0.01
Hungary	3,700	3,371	10,109	9,236	— 8.6	0.11	0.10	45,624	0.07
Italy	70	64	191	175	— 8.4	.....	.....	3,512	0.01
Netherlands	3,444	4,316	9,410	11,825	+ 25.7	0.10	0.13	9,728	0.01
Poland	1,000	995	2,732	2,726	— 0.2	0.03	0.03	278,444	0.45
Roumania	34,177	29,000	93,380	79,452	— 14.9	1.00	0.86	1,221,063	1.99
U. S. S. R. (Excl. Sakhalin)	218,000	233,625	595,629	640,068	+ 7.5	6.39	6.94	6,292,473	10.20
Yugoslovia	365	380	997	1,041	+ 4.4	0.01	0.01	2,526	.....
Total Europe	273,176	287,492	746,383	787,649	+ 5.5	8.01	8.54	8,048,361	13.05
AFRICA:									
Egypt	13,173	15,808	35,992	43,310	+ 20.3	0.39	0.47	136,088	0.22
Algeria	.....	2	.....	5	.....	.....	.....	145	.....
Morocco	96	144	262	395	+ 50.8	.....	.....	577	.....
Total Africa	13,269	15,954	36,254	43,710	+ 20.6	0.39	0.47	136,810	0.22
ASIA, Middle East:									
Bahrein	10,915	10,985	29,822	30,096	+ 0.9	0.32	0.33	109,900	0.18
Iran	190,384	204,712	520,175	560,855	+ 7.8	5.58	6.08	2,143,378	3.47
Iraq	26,466	31,729	72,311	86,929	+ 20.2	0.78	0.94	443,316	0.72
Kuwait	46,547	89,930	127,178	246,383	+ 93.7	1.36	2.67	158,633	0.26
Saudi Arabia	142,853	174,009	390,309	476,737	+ 22.1	4.19	5.16	519,060	0.84
Turkey	91	910	249	2,493	+901.2	.....	0.03	1,001	.....
Total Middle East	417,256	512,275	1,140,044	1,403,493	+ 23.1	12.23	15.21	3,375,288	5.47
ASIA, Far East:									
Borneo, British (Sarawak and Brunei)	18,588	25,114	50,787	68,806	+ 35.5	0.54	0.74	182,354	0.30
Burma	339	260	926	712	— 23.1	0.01	0.01	339,375	0.55
India and Pakistan	2,490	2,886	6,803	7,907	+ 16.2	0.07	0.09		
China	533	500	1,456	1,370	— 5.9	0.02	0.01	3,801	0.01
Formosa (Taiwan)	18	18	49	49	.....	.....	.....	269	.....
Japan	1,291	1,353	3,528	3,707	+ 5.1	0.04	0.04	96,566	0.16
Netherlands, Indies, (Neth. Borneo, Java, Sumatra, Ceram, New Guinea)	31,910	44,039	87,186	120,655	+ 38.4	0.93	1.31	1,218,614	1.97
Sakhalin (Part of U.S.S.R.)	7,000	7,000	19,126	19,178	+ 0.3	0.21	0.21	87,240	0.14
Total Far East	62,169	81,170	169,861	222,384	+ 30.9	1.82	2.41	1,928,219	3.13
ASIA—Total	479,425	593,445	1,309,905	1,625,877	+ 24.1	14.05	17.62	5,303,507	8.60
AUSTRALIA-NEW ZEALAND	2	2	5	5	.....	.....	.....	44	.....
WORLD, Undistributed	.....	.....	.....	.....	.....	.....	.....	1,044	.....
TOTAL WORLD	3,412,883	3,367,720	9,324,817	9,226,630	— 1.1	100.00	100.00	61,704,445	100.00

* Figures from Bureau of Mines, except 1949; will not always check with those in other tables which are from private sources.

WORLD CRUDE PRODUCTION—Continued

is indicative of the country's ability to produce. Lacking adequate outlets for its oil, Iran production is being held well below its potential. Saudi Arabia is in much the same position as Iran regarding transportation, but the sheikdom increased its annual production 22.1 percent from 142,853,000 barrels in 1948 to 174,009,000 barrels in 1949. Kuwait's production increased 93.7 percent from 46,547,000 barrels in 1948 to 89,930,000 barrels last year. Drilling operations now going forward in the Neutral Zone, between Saudi Arabia and Kuwait, may well develop additional supplies of oil in the Middle East area.

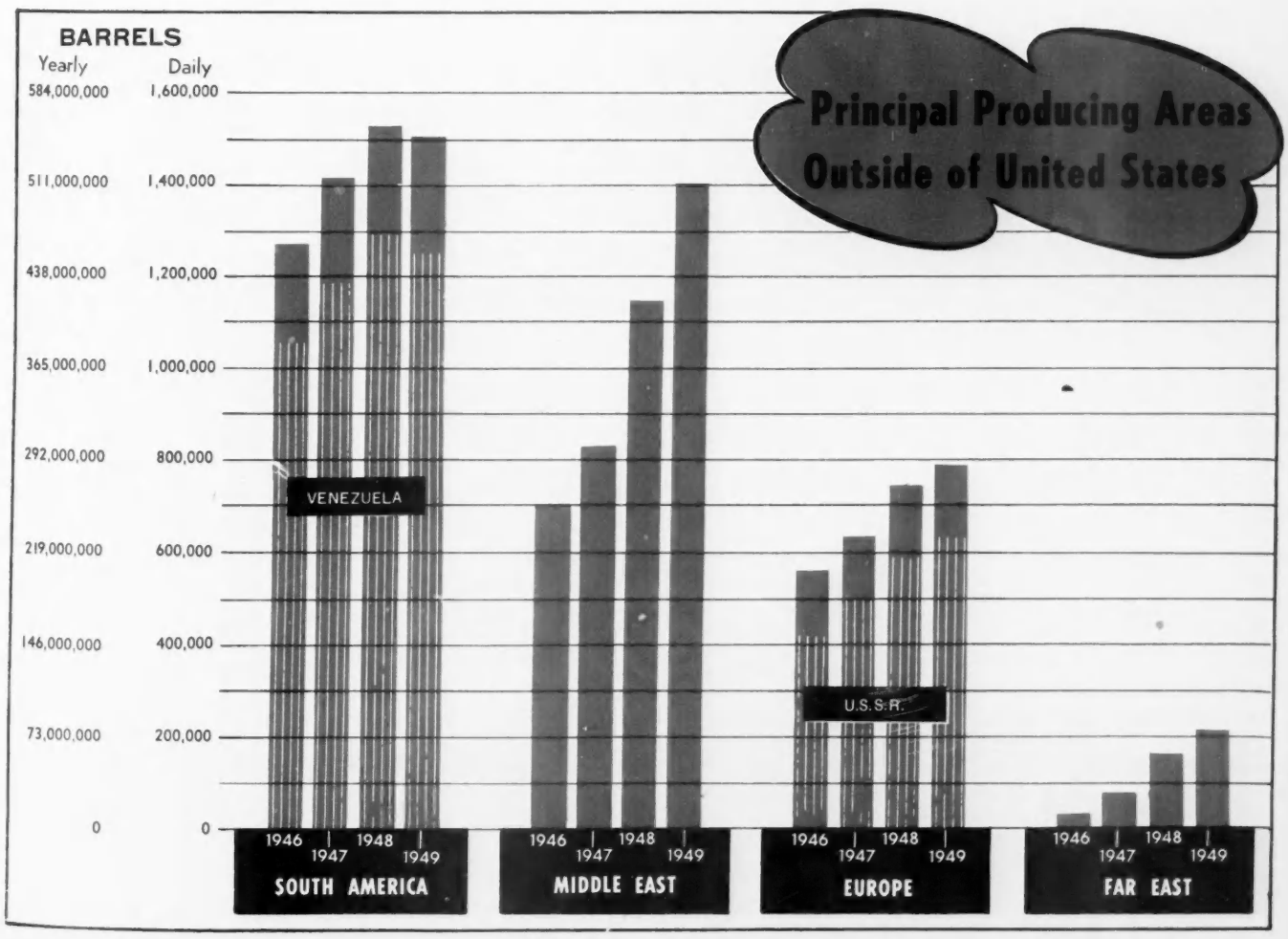
Turkey, another Middle East country, increased its oil output 901.2 percent, jumping from 91,000 barrels in 1948 to 910,000 barrels last year. Drilling activity in the country is being stepped up and the extent of its reserves will probably be ascertained in the next few years.

Production figures from U.S.S.R. are more or less indefinite, but it is believed that the Soviet nation increased its output about 7.5 percent in 1949. The Five Year Plan goal set for 1949 was a 12.3 percent increase, but the Russians themselves inadvertently indicated that this goal lacked being met by some 40 percent. Russia is handicapped by lack of adequate drilling and production equipment to expand its industry, as well as lack of trained personnel to carry on the work. Most of the 29,000,000 barrels of oil from Roumania, the 3,371,000 from Hungary, 995,000 barrels from Poland and a large share of the 7,652,000 barrels from Austria went to the U.S.S.R. in 1949. In some cases this oil was called "war reparations" but in most instances Russia did not attempt to justify this stripping of its satellites' oil reserves. It is significant to note that production in Hungary, Roumania, and Poland is now rapidly falling off and the future of these countries as oil producers will probably be negligible. It is generally agreed in military circles that the lack of adequate oil supplies has prevented the U.S.S.R. from being more aggressive than it has been in the past four years.

British Borneo increased its oil production 35.5 percent in 1949 to reach a total output of 25,114,000 barrels. The importance of this area to Great Britain can be seen by the fact that the state of Brunei in Borneo is the largest oil producing area within the British Commonwealth. It is strategically located to best supply the markets of the Far East and Oceania with sterling oil and thus help maintain British trade in that area.

India and Pakistan combined increased their oil production during 1949 by 16.2 percent to 2,886,000 barrels as compared with 2,490,000 barrels in 1948. Most of this increase was made by Pakistan with output going from 560,000 barrels in 1948 to 936,000 barrels last year. Revised concession regulations in Pakistan have created an incentive for private capital to enter the oil industry on a large scale and the territory expects to see great advances in petroleum activity in the next few years.

China's production of about 500,000 barrels of oil during 1949 is of interest only as a gauge of oil supply available to countries under Soviet influence. The figure is based wholly on estimates from the few sources able to maintain limited contacts in Communist China.



World Crude Oil Production, By Countries, By Years (Part 1)

(Complete production history of world, in thousands of barrels of 42 U. S. Gallons. Sources: *Mineral Resources and Minerals Yearbook*, except as otherwise indicated)

YEAR	World Total	Percent Produced by U.S.	NORTH AMERICA					SOUTH AMERICA									
			Canada	Mexico	United States	Cuba	Total North America	Argentina	Bolivia	Brazil	Chile	Colombia	Ecuador	Peru	Trinidad	Venezuela	Total South America
1857	2	....															
1858	4	....															
1859	6	31			2		2										
1860	509	98			500		500										
1861	2,131	99			2,114		2,114										
1862	3,092	99	12		3,057		3,069										
1863	2,763	94	83		2,611		2,694										
1864	2,304	92	90		2,116		2,206										
1865	2,716	92	110		2,498		2,608										
1866	3,899	92	175		3,598		3,773										
1867	3,709	90	190		3,347		3,537										
1868	3,990	91	200		3,646		3,846										
1869	4,696	90	220		4,215		4,435										
1870	5,799	91	250		5,261		5,511										
1871	5,730	91	270		5,205		5,475										
1872	6,877	92	308		6,293		6,601										
1873	10,838	91	365		9,894		10,259										
1874	11,933	92	169		10,927		11,096										
1875	9,977	88	220		8,788		9,008										
1876	11,051	83	312		9,133		9,445										
1877	15,754	85	312		13,350		13,662										
1878	18,417	84	312		15,397		15,709										
1879	23,601	84	575		19,914		20,489										
1880	30,018	88	350		26,286		26,636										
1881	31,993	86	275		27,661		27,936										
1882	35,704	85	275		30,350		30,625										
1883	30,255	78	250		23,450		23,700										
1884	35,969	67	250		24,218		24,468										
1885	36,765	59	250		21,859		22,109										
1886	47,243	59	584		28,065		28,649										
1887	47,807	59	526		28,283		28,809										
1888	52,165	53	695		27,612		28,307										
1889	61,507	57	705		35,164		35,869										
1890	76,633	60	795		45,824		46,619										
1891	91,100	60	755		54,293		55,048										
1892	88,739	57	780		50,515		51,295										
1893	92,038	53	798		48,431		49,229										
1894	89,337	55	829		49,344		50,173										
1895	103,692	51	726		52,892		53,618										
1896	114,199	53	727		60,960		61,687							47			47
1897	121,993	50	710		60,476		61,186							71			71
1898	124,979	44	758		55,364		56,122							71			71
1899	131,147	44	808		57,071		57,879							89			89
1900	149,157	43	913		63,621		64,534							274			274
1901	167,440	41	757	10	69,389		70,156							275			275
1902	181,809	49	531	40	88,767		89,338							287			287
1903	194,879	52	487	75	100,461		101,023							278			278
1904	217,948	54	553	126	117,081		117,760							290			290
1905	215,091	63	634	251	134,717		135,602							373			373
1906	213,263	59	569	502	126,494		127,565							531			531
1907	263,957	63	789	1,005	166,095		167,889	B						751			751
1908	285,287	63	828	3,933	178,527		182,988	12						945	B		957
1909	298,709	61	421	2,714	183,171		186,306	18						1,411	57		1,486
1910	327,763	64	316	3,634	209,557		213,507	20						1,258	143		1,421
1911	344,361	64	291	12,553	220,449		233,293	13						1,465	285		1,763
1912	352,443	63	243	16,558	222,935		239,736	47						1,752	437		2,236
1913	385,345	64	226	25,696	248,446		274,370	131						2,071	504		2,706
1914	407,544	65	215	26,235	265,763		292,213	276						1,837	644		2,757
1915	432,033	65	215	32,911	281,104		314,230	513						2,579	750		3,842
1916	457,500	66	198	40,546	300,767		341,511	867						2,593	929		4,389
1917	502,891	67	214	55,293	335,316		390,823	1,218					57	2,577	1,602	120	5,574
1918	503,515	71	205	63,828	355,928		420,061	1,353					C60	2,527	2,082	333	6,355
1919	555,875	68	241	87,073	378,367		465,681	1,331					C60	2,628	1,841	425	6,285
1920	688,884	64	196	157,069	442,929		600,194	1,651					C60	2,817	2,083	457	7,068
1921	766,002	62	188	193,398	472,183		665,769	2,036				67	C60	3,699	2,354	1,433	9,649
1922	858,898	65	179	182,278	557,531		739,988	2,866				323	C60	5,314	2,445	2,201	13,209
1923	1,015,736	72	170	149,585	732,407		882,162	3,400				425	87	5,699	3,051	4,201	16,863
1924	1,014,318	70	161	139,678	713,940		853,779	4,639				445	C100	8,379	4,057	9,042	26,662
1925	1,068,933	71	352	115,515	763,743		879,590	6,336				1,007	160	9,232	4,387	19,687	40,809
1926	1,096,823	70	364	90,421	770,874		861,659	7,851				6,444	214	10,762	4,971	36,911	67,153
1927	1,262,582	71	477	64,121	901,129		965,727	8,630				15,014	537	10,127	5,380	63,134	102,822
1928	1,324,774	68	624	50,151	901,474		952,249	9,070				19,897	1,084	12,006	7,684	105,749	155,490
1929	1,485,867	68	1,117	44,688	1,007,323		1,053,128	9,391	B			20,385	1,381	13,422	8,716	137,472	190,767
1930	1,410,037	64	1,522	39,530	898,011		939,063	9,002	56			20,346	1,553	12,449	9,419	136,669	189,494
1931	1,372,532	62	1,543	33,039	851,081		885,663	11,709	25			18,237	1,762	10,089	9,744	116,613	168,179
1932	1,309,677	60	1,044	32,805	785,159		819,008	13,139	44			16,414	1,597	9,899	10,126	116,541	167,760
1933	1,442,146	63	1,145	34,001	905,656	23	940,825	13,691	112			13,158	1,620	13,257	9,561	117,720	169,119
1934	1,522,288	60	1,417	38,172	908,065	28	947,682	14,024	159			17,341	1,637	16,314	10,894	136,103	196,472
1935	1,654,495	60	1,447	40,241	996,596	47	1,038,331	14,297	164			17,598	1,732	17,067	11,671	148,254	210,783
1936	1,791,546	61	1,500	41,028	1,099,687	62	1,142,277	15,458	105			18,756	1,942	17,593	13,237	154,794	221,885
1937	2,039,231	63	2,944	46,907	1,279,160	33	1,329,044	16,355	122			20,599	2,161	17,457	15,503	186,230	258,427
1938	1,988,041	61	6,966	38,506	1,214,355	78	1,259,905	17,076	226			21,582	2,246	15,839	17,737	188,174	262,880
1939	2,086,160	60.6	7,838	42,898	1,264,962	112	1,315,810	18,613	215			23,857	2,313	13,508	19,270	206,470	284,246
1940	2,149,821	62.9	8,591	44,036	1,253,214	142	1,405,983	20,609	288	2		25,593	2,349	12,126	22,227	185,570	268,764
1941	2,220,657	63.1	10,134	42,196	1,402,228	150	1,454,708	21,873	235	3		24,553	1,557	11,935	20,506	228,430	309,092
1942	2,093,098	66.2	10,365	34,815	1,386,645	151	1,431,976	23,704	308	33		10,487	2,278	13,629	22,069	147,675	220,183
1943	2,256,623	66.7	10,059	35,163	1,505,613	107	1,550,935	27,714	334	48		13,261	2,315	14,654	21,385	177,631	257,342
1944	2,592,513	64.7	10,099	38,203	1,677,904	109	1,726,315	24,230	314	58		22,291	2,967	14,389	22,139	257,046	343,434
1945	2,594,957	66.0	8,483	43,547	1,713,655	149	1,765,834	22,881	382	79		22,449	2,664	13,744	21,093	323,156	406,448
1946	2,745,666	63.1	7,586	49,235	1,733,939	269	1,791,029	20,604	363	67		22,118	2,323	12,468	20,233	388,486	466,662
1947	3,021,666	61.5	7,692	56,284	1,856,987	300	1,921,263	21,846	377	97		24,794	2,282	12,764	20,521	434,905	517,586
1948*	3,412,883	59.2	12,295	58,370	2,020,185	159	2,091,009	23,253	464	143		23,743	2,611	14,069	20,199	471,520	556,002
1949*	3,367,720	54.6	21,492	60,736	1,840,307	161	1,922,696	22,590	678	109	55	29,644	2,615	14,796	20,468	457,176	548,131
Total	61,704,445	63.1	162,630	2,409,599	38,943,881	2,080	41,518,190	434,337	4,971	639	55	470,828	46,444	386,483	392,404	4,960,328	6,696,489

* **WORLD OIL** from private sources. B Less than 1,000 barrels. C Estimated production.

World Crude Oil Production, By Countries, By Years (Part 2)

(Complete production history of world, in thousands of barrels of 42 U. S. Gallons. Sources: *Mineral Resources and Mineral Yearbook*, except as otherwise indicated)

	EUROPE														AFRICA			
YEAR	Albania	Austria	Czecho-slovakia	Great Britian	France	Ger-many	Hun-gary	Italy	Nether-lands	Poland	Rou-mania	[F]U.S.S.R. (Russia)	Yugo-slavia	[F]Total Europe	Egypt	Algeria	Morocco	Total Africa
1857											2			2				
1858											4			4				
1859											4			4				
1860											9			9				
1861								[B]			17			17				
1862								[B]			23			23				
1863								[B]			28	41		69				
1864								[B]			33	65		98				
1865								2			39	67		108				
1866								1			42	83		126				
1867								1			51	120		172				
1868								[B]			56	88		144				
1869								[B]			59	202		261				
1870								[B]			84	204		288				
1871								[B]			90	165		255				
1872								[B]			91	185		276				
1873								[B]			104	475		579				
1874								1		150	103	583		837				
1875								1		158	108	697		964				
1876								3		164	111	1,321		1,599				
1877								3		170	108	1,801		2,082				
1878								4		176	109	2,401		2,690				
1879								3		215	110	2,761		3,089				
1880						9		2		229	115	3,001		3,356				
1881						29		1		287	122	3,601		4,040				
1882						58		2		330	136	4,538		5,064				
1883						27		2		365	139	6,002		6,535				
1884						46		3		408	211	10,805		11,473				
1885						41		2		465	193	13,925		14,626				
1886						74		2		306	168	18,006		18,556				
1887						74		1		344	182	18,368		18,969				
1888						85		1		467	219	23,049		23,821				
1889						68		1		515	298	24,609		25,491				
1890						108		3		659	383	28,691		29,844				
1891						109		8		631	488	34,573		35,809				
1892						101		18		646	593	35,775		37,133				
1893						100		19		693	535	40,457		41,804				
1894						123		21		949	508	36,375		37,976				
1895						121		26		1,453	576	46,140		48,316				
1896						145		18		2,444	543	47,221		50,371				
1897						166		14		2,226	571	54,399		57,376				
1898						184		15		2,376	776	61,610		64,961				
1899						192		16		2,314	1,426	65,955		69,903				
1900						358		12		2,347	1,629	75,780		80,126				
1901						314		16		3,251	1,678	85,168		90,427				
1902						354		19		4,142	2,060	80,540		87,115				
1903						446		18		5,235	2,763	75,591		84,053				
1904						637		26		5,947	3,599	78,537		88,746				
1905						561		44		5,766	4,421	54,960		65,752				
1906						579		54		5,468	6,378	58,897		71,376				
1907						757		60		8,456	8,118	61,851		79,242				
1908						1,009		51		12,612	8,252	62,187		84,111				
1909						1,019		42		14,933	9,327	65,970		91,291				
1910						1,032		51		12,673	9,724	70,337		93,817				
1911						1,017		75		10,519	11,108	66,184		88,903	21			21
1912						1,031		54		8,535	12,976	68,019		90,615	214			214
1913						857		47		7,818	13,555	62,834		85,111	98			98
1914						781		40		6,436	12,827	67,020		87,104	753	1		754
1915						703		44		5,352	12,030	68,548		86,677	212	4		216
1916						656		51		6,587	8,945	65,817		82,056	404	8		412
1917					[G]	642		41		6,228	3,721	63,072		73,704	943	9		952
1918					363	270		35		6,032	8,730	27,168		42,598	1,935	7		1,942
1919			48	2	334	265		35		6,096	6,618	31,752		45,150	1,517	5		1,522
1920			69	3	356	246		35		5,607	7,435	25,430		39,181	1,042	4		1,046
1921			94	3	389	274		32		5,167	8,368	28,968		43,295	1,255	3		1,258
1922			120	1	496	319		31		5,227	9,843	35,692		51,729	1,188	9		1,197
1923			74	1	494	346		34		5,402	10,867	39,147		56,365	1,054	9		1,063
1924			76	2	497	406		39		5,657	13,369	45,355		65,401	1,122	11		1,133
1925			158	3	459	541		61		5,960	16,650	52,448		76,280	1,226	12		1,238
1926			150	2	478	653		41		5,844	23,314	64,311		94,793	1,188	9		1,197
1927			112	2	504	663		47		5,342	26,868	77,018		110,056	1,267	8		1,275
1928			94	1	512	630		46		5,492	30,773	[D]84,745		122,293	1,842	8		1,850
1929			93		535	704		45		4,988	34,758	[D]99,507		140,630	1,868	20		1,888
1930			157	[B]	523	1,182		59		4,904	41,624	[D]125,555		174,004	1,996	16		2,012
1931			134	[E]	520	1,606		124		4,662	49,127	162,842		219,015	2,038	[E]		2,038
1932			126	[E]	530	1,608		208		4,116	53,815	154,367		214,770	1,895	[E]	7	1,902
1933	11		122	[E]	562	1,665		204		4,072	54,020	154,840		215,496	1,663	[E]	7	1,670
1934	10		178	[E]	557	2,187		151		3,913	62,063	174,318		243,377	1,546	[E]	6	1,552
1935	41	44	133	[E]	541	2,996		119		3,812	61,310	182,386	2	251,384	1,301	[E]	4	1,305
1936	273	50	127	[E]	503	3,115		123		3,789	63,659	186,206	1	257,846	1,278	[E]	4	1,282
1937	619	221	123	[E]	502	3,176	16	110		3,716	52,452	193,241	4	254,180	1,196	[E]	22	1,218
1938	752	383	130	[E]	513	3,861	288	101		3,763	48,487	204,956	9	263,243	1,581	[E]	27	1,608
1939	934	1,240	120		500	4,487	1,103	91		3,898	45,648	216,866	10	274,897	4,666	[E]	27	4,693
1940	1,497	2,808	163	124	496	7,371	1,881	85		3,891	43,168	218,600	10	280,094	6,505	[E]	27	6,532
1941	1,324	4,238	183	223	414	6,303	3,183	95		1,793	40,517	238,150	10	296,443	8,546	[E]	27	8,573
1942	1,601	5,899	271	605	463	5,191	5,037	101		2,794	42,094	227,470	10	291,536	8,275	[E]	41	8,316
1943	1,001	7,478	200	839	356	4,973	6,347	75		3,500	39,182	200,750	10	264,711	8,953	[E]	39	8,992
1944	334	8,218	185	703	300	6,154	6,204	75	14	3,000	26,191	275,000	500	326,878	9,416	[E]	32	9,448
1945	267	3,074	91	532	197	3,935	5,018	75	41	750	34,772	148,953	450	198,155	9,406	[E]	26	9,432
1946	1,000	5,734	196	412	367	4,539	5,146	82	435	866	31,434	157,673	400	208,284	9,070	[E]	20	9,090
1947	1,800	6,285	210	351	363	4,035	4,330	80	1,478	951	28,552	187,463	365	236,263	8,627	[E]	21	8,648
1948*	[C]1,400	5,711	[C]204	323	362	4,420	3,700	70	3,444	[C]1,000	34,177	[C]218,000	[C]365	273,176	13,173	[E]	96	13,269
1949*	[C]1,250	[C]7,652	[C]209	338	465	5,827	[C]3,371	[C]64	4,316	[C]995	29,000	[C]233,625	[C]380	287,492	15,808	2	144	15,954
Total	14,124	59,035	4,350	4,470	14,451	98,561	45,624	3,512	9,728	278,444	1,221,063	6,292,473	2,526	8,048,361	136,088	145	577	136,810

* WORLD OIL from private sources. [B] Less than 1,000 barrels. [C] Estimated production. [D] Year ended September 30. [E] No more data available. [F] Includes field in Russian Asia other than Sakhalin. [G] France's earlier production credited to Germany.

World Crude Oil Production, By Countries, By Years (Part 3)

(Complete production history of world, in thousands of barrels of 42 U. S. Gallons. Sources: *Mineral Resources* and *Mineral Yearbook*, except as otherwise indicated)

Year	ASIA—Middle East						ASIA—Far East																
	Bahrein	Iran	Iraq	Kuwait	Saudi Arabia	Total Middle East	British Borneo	[E]Burma-India-Pakistan			China	[H] Formosa	Japan	Netherland India	Sakhalin	Total Far East	[F]Total Asia	Australia-N.Z.	Rest of World
								Burma	Pakistan	India									
1857																			
1858																			
1859																			
1860									..										
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1872																			
1873																			
1874																			
1875													5			5	5		
1876													7			7	7		
1877													10			10	10		
1878													18			18	18		
1879													23			23	23		
1880													26			26	26		
1881			..										17			17	17		
1882													15			15	15		..
1883													20			20	20		
1884													28			28	28		..
1885													30			30	30		
1886													38			38	38		
1887													29			29	29		
1888													37			37	37		
1889													53			147	147		
1890									94				52			170	170		
1891									118										
1892									190				53			243	243		
1893									242				69			311	311		
1894	..								299				106	600		1,005	1,005		
1895									327				173	688		1,188	1,188		
1896									372				170	1,216		1,758	1,758		
1897									430				237	1,427		2,094	2,094		
1898									546				262	2,552		3,360	3,360		
1899									542				319	2,964		3,825	3,825		
1900									941				539	1,796		3,276	3,276		
1901									1,079				871	2,253		4,203	4,203		
1902									1,431				1,117	4,014		6,562	6,562		20
1903									1,617				1,117	4,014		5,043	5,043		26
1904									2,510				1,200	5,770		9,489	9,489		36
1905									3,385				1,219	6,508		11,112	11,112		40
1906									4,137				1,347	7,850		13,334	13,334		30
1907									4,016				1,564	8,181		13,761	13,761		30
1908									4,344				1,718	9,983		16,035	16,045		30
1909									5,047				1,871	10,283		17,021	17,201		30
1910									6,677				1,887	11,042		19,606	19,606		20
1911									6,138				1,829	11,031		18,998	18,998		20
1912									6,451				1,737	12,173		20,361	20,361		20
1913		1,857				1,857	141		7,117				1,659	10,846		19,622	19,622		20
1914		2,910				2,910	318		7,930				1,940	11,172		21,183	23,040		20
1915		3,616				3,616	392		7,410				2,636	11,422		21,786	24,696		20
1916		4,477				4,477	629		8,202				2,928	11,920		23,442	27,058		10
1917		7,147				7,147	542		8,491				2,963	12,547		24,630	29,107		25
1918		8,623				8,623	504		8,079				2,861	13,180		24,662	31,809		29
1919		10,139				10,139	596		8,188				2,441	12,778		23,911	32,534		25
1920		12,230				12,230	1,020		8,736				2,238	15,508		27,078	37,217		20
1921		16,673				16,673	1,411		8,375				2,221	17,529		29,145	41,375		20
1922		22,247				22,247	2,849		8,734				2,233	16,958	2	29,338	46,011		20
1923		25,230				25,230	3,940		8,529				2,055	17,066	7	30,506	52,753		22
1924		32,373				32,373	4,163		8,406				1,804	19,870	9	34,029	59,259		24
1925		35,038				35,038	4,257		8,416				1,814	20,473	80	34,946	67,319		24
1927		35,842				35,842	4,942		8,274				1,915	21,422	87	35,955	70,993		23
1927		39,688	338			40,026	4,943		8,011				1,785	21,243	181	36,162	72,004		17
1928		43,461	713			44,174	§5,223		8,032				1,750	27,459	440	42,663	82,689		13
1929		42,145	798			42,943	5,290		8,741				1,944	32,118	677	48,703	92,877		15
1930		45,828	913			46,741	4,907		8,747				2,023	39,279	[D]1,134	56,473	99,416		38
1931		44,376	830			45,206	3,854		8,292				1,950	41,729	[D]1,805	58,683	105,424		40
1932		49,471	836			50,307	3,796		8,200				2,050	35,539	2,734	52,377	97,583		54
1933	31	54,392	917			55,340	4,490		8,817				1,630	39,001	2,631	55,875	106,182		62
1934	285	57,851	7,689			65,825	5,140		8,743				1,455	42,606	2,338	59,632	114,972		71
1935	1,265	57,273	27,408			85,946	5,546	7,181	10,503	[E]	2,038		1,834	46,925	2,881	67,283	133,108		96
1936	4,645	62,718	30,406		20	97,789	5,209	7,588	[E]	1,978			2,249	47,171	2,545	66,730	152,676	5	4
1937	7,762	77,804	31,836		65	117,467	6,009	7,848	[E]	2,162			2,440	50,025	3,212	70,452	168,241	5	4
1938	8,298	78,372	32,643		495	119,808	6,913	7,538	[E]	2,488			2,488	56,724	3,656	78,887	196,354	4	4
1939	7,589	78,151	30,791		3,934	120,465	7,097	7,873	[E]	2,327	4		2,511	57,318	[C]3,821	80,589	200,397	4	4
1940	7,074	66,317	24,225		5,075	102,691	7,047	7,731	[E]	2,302	10		2,654	62,087	4,000	86,042	206,507	3	4
1941	6,794	50,777	12,650		4,310	74,531	6,864	7,762	[E]	2,899	87	62	2,639	62,011	4,000	85,740	188,431	3	14
1942	6,241	72,256	19,726		4,530	102,753	3,000	2,500	[E]	2,792	340	48	1,929	53,704	4,000	77,307	151,338	3	....
1943	6,572	74,612	24,848		4,868	110,900	4,500	1,000	[E]	2,735	447	38	1,652	24,000	4,000	38,332	141,085	2	....
1944	6,714	102,045	30,943		7,794	147,496	6,000	750	[E]	2,784	505	40	1,727	48,294	5,000	63,741	174,641	2	....
1945	7,309	130,526	35,112		21,311	194,258	2,100	725	[E]	2,363	484	11	1,601	22,260	5,000	38,940	186,436	2	....
1946	8,010	146,819	35,665	5,931	59,944	256,369	2,050	15	[E]	2,193	513	16	1,544	7,600	6,000	20,827	215,085	3	....
1947	9,411	154,998	35,834	16,225	89,852	306,320	12,970	59	330	1,533	378	18	1,343	2,100	6,000	14,230	270,599	2	....
1948*	10,915	190,384	26,466	46,547	142,853	417,256	18,588	[C]339	560	1,930	[C]533	[C]18	1,276	8,020	7,000	31,584	337,904	2	....
1949*	10,985	204,712	31,729	89,930	174,009	512,275	25,114	[C]260	936	1,950	[C]500	[C]18	1,291	31,910	[C]7,000	62,169	479,425	[C]2	....
													1,353	44,039	[C]7,000	81,170	593,445	[C]2	....
Total	109,900	2,143,378	443,316	158,633	519,060	3,375,288	182,354		339,375		3,801	269	96,566	1,218,614	87,240	1,928,219	5,303,507	44	1,044

Year	Turkey
1948	91
1949	910
Total	1,001

* **WORLD OIL** from private sources. [B] Less than 1,000 barrels. [C] Estimated production. [D] Year ended Spetember 30. [E] Separation of British India and Burma prior to 1935 not available from U. S. Bureau of Mines data used here. Data by Dudley Stamp in "Petroleum Development and Technology, 1933," and in A.I.M.E. "Transactions" indicate cumulatives through 1934 as follows: Burma 184,528, India 20,756. Pakistan included with India prior to 1947. [F] Exclusive of U.S.S.R. fields in Asia, other than Sakhalin, which are included with U.S.S.R. in Europe. [G] Beginning of production in Brunei. [H] Formosa included with Japan prior to 1941.

WORLD COMPLETIONS and FOOTAGE

THE number of well completions fell off in the world during 1949, being 666 less than the previous year, while total footage drilled increased by 2,445,710 feet. The drop in completions and increase in footage drilled were due almost entirely to the U. S., where deeper horizons are being sought, and consequently, drilling operations were not curtailed but the rigs were staying longer on each well. While the U. S. staked fewer locations in 1949, drilling outside the U. S. increased from 3107 completions in 1948 to 3404 in 1949. Total world completions in 1949 were 42,451, of which 39,047, or 92 percent were drilled in the U. S.

Outside of the U. S. the trend is to deeper drilling also. The increase in number of wells drilled outside the U. S. was 9.5 percent, while the increase in footage drilled was 12.8 percent. Of these wells drilled outside the U. S., 2274 were successful oil wells while in 1948 only 1925 were completed as oil wells—an increase of 5 percent.

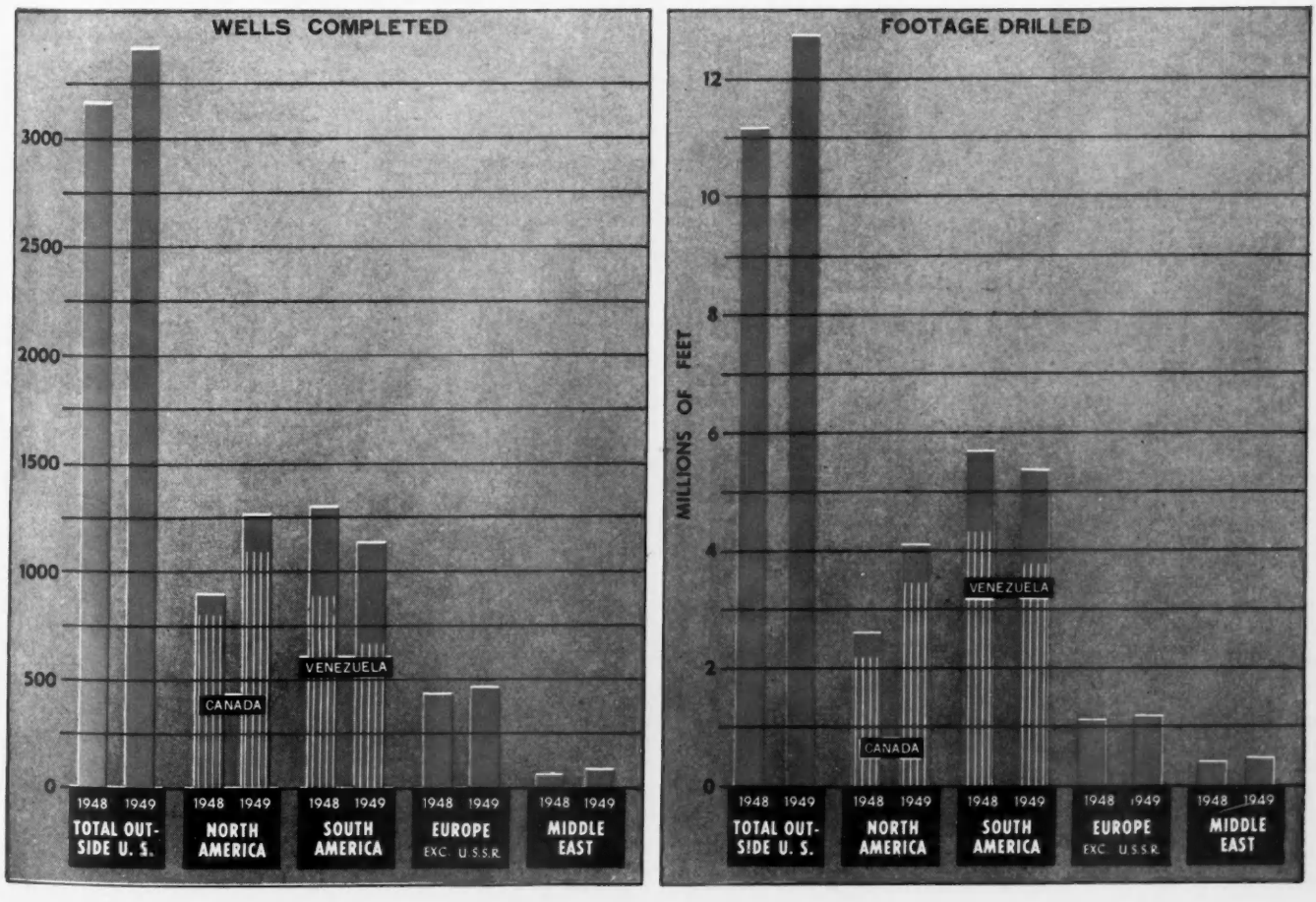
The Western Hemisphere remains in the foreground of the oil picture, with Canada increasing the number of completions from 818 in 1948 to 1102 last year, and the total footage drilled from 2,225,616 to 3,462,831. Venezuela, usually a pacemaker outside the U. S., fell off from 889 completions to 670 in 1949, with a decrease in footage from 4,349,108 to 3,799,209. The slump in Venezuelan activity was largely due to the decrease in demand for its oil. The 2405 wells drilled in North and South America, exclusive of the U. S., represented more than 70.6 percent of all foreign drilling (excluding Russia and some of its satellites), the same percentage as in 1948. Venezuela and Canada accounted for 52 percent of such drilling.

A spectacular increase in drilling again took place in Canada, which is rapidly approaching self-sufficiency in oil. During the year 1102 wells were completed as compared with 818 in 1948. Footage drilled in 1949 was 3,462,831 as compared with 2,225,616 the previous year. Some of the drilling activity may slow down in Canada this year while efforts are made to increase the transportation facilities from the remote fields to the distant industrial centers. Most of Canada's production is now under voluntary proration because of lack of outlet for the available oil. This trend can be seen in the fact that only 77 drilling rigs were operating in Western Canada at the end of 1949 as compared with 85 at the same period the previous year. Venezuela, usually aggressive in drilling work, fell from 152 drilling rigs in operation at the end of 1948 to 81 at the same period in 1949. If Venezuelan markets continue to fall off and Canada improves its oil transportation system, the latter country will soon move to the front in drilling activities outside of the U. S.

South America as a whole experienced a drop in well completions and footage in 1949, due entirely to Venezuela's cutback in such work. Colombia went ahead with 34 more completions than in 1948 and Peru recorded 19 more completions. The other countries made small gains, with only Argentina and Bolivia dropping off 2 and 1 completions, respectively.

The Middle East dropped from a 43.8 percent increase in drilling in 1948 to a 29 percent increase in 1949. This drop in drilling activity did not, however, reflect upon the oil output from the Middle East which increased about 23 percent over 1948 production. Drilling operations, as such, are practically nonexistent as compared with the other oil

Drilling Activity Outside of U. S. in 1948-1949



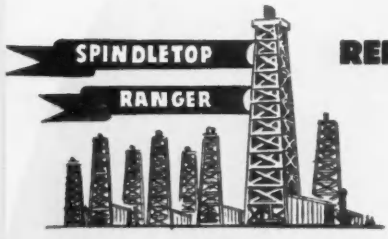
YOUR SUPPLY STORE

from SPINDLETOP to SCURRY

1920
REPUBLIC WAS there

1930
REPUBLIC IS STILL there

REPUBLIC IS



1910
REPUBLIC WAS there

40 years of service to the Oil Industry
Today ..... from 54 Points

REPUBLIC IS there

in 1960

REPUBLIC WILL BE there!

1940

STILL there

1950

40th Anniversary

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WORLD COMPLETIONS and FOOTAGE—Continued

areas of the world, but the oil produced from the few wells drilled is phenomenal. No other area produces so much oil from so few wells.

Africa is expected to gain prominence in the next few years. Algeria had 20 well completions in 1949 as compared with 6 the previous year. France is especially interested in Algeria and Morocco as possible new sources of oil for domestic needs. Australia also will actively begin seeking oil following several years of surface geological study. Several favorable basins are expected to be drilled this year.

Drilling Activity in 1948 and 1949 by Countries

COUNTRY	Total Wells Completed in 1948	Footage Drilled in 1948 Completions	Wells Drilling End of 1948	WELLS COMPLETED IN 1949					Wells Drilling End of 1949
				Oil	Gas	Dry	TOTAL Wells	TOTAL Footage	
NORTH AMERICA, Except United States:									
Alaska	1	7,000	.....	.....	1	2	3	9,920[1]	1
Canada	818	2,225,616	85	566	197	339	1,102	3,462,831	77[2]
Mexico	80	420,905	35	82	14	62	158	657,965	26
Total North America, Except United States	889	2,653,521	120	648	212	403	1,263	4,130,716	104
WEST INDIES:									
Cuba	n.a.	n.a.	n.a.	.....	.....	1	1	5,045	.....
Trinidad	134	553,822	25	129	1	14	144	587,800	18
CENTRAL AMERICA:									
Nicaragua	1	6,297	.....	.....	.....	.....	.....	.....	.....
Panama	1	8,000	1	.....	.....	.....	.....	.....	.....
SOUTH AMERICA:									
Argentina	74	238,050	16	62	6	4	72	207,314	6
Bolivia	6	14,983	21	3	.....	2	5	14,256	5
Brazil	15	38,438	17	13	1	3	17	48,010	5
Chile	6	45,000	2	5	1	5	11	82,965	1
Colombia	72	413,833	21	80	.....	26	106	557,972	17
Ecuador	63	105,184	n.a.	67	.....	.....	67	134,987	n.a.
Paraguay	1	10,331	1	n.a.	n.a.	n.a.	n.a.	n.a.	.....
Peru	175	516,722	39	142	3	49	194	551,575	30
Venezuela	889	4,349,108	152	598	3	69	670	3,799,209	81
Total South America	1,301	5,731,649	269	970	14	158	1,142	5,396,288	135
EUROPE:									
Albania	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Austria	40	n.a.	30	n.a.	n.a.	n.a.	5	n.a.	n.a.
Czechoslovakia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Denmark	.....	.....	1	.....	.....	.....	.....	.....	1
France	63	234,850	17	30	3	52	85	256,200	17
Germany	185	553,068	45	221	.....	128	349	864,351	25
Great Britain	8	21,397	2	.....	.....	.....	.....	.....	.....
Hungary	28	89,151	7	n.a.	3	n.a.	n.a.	n.a.	n.a.
Italy	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Netherlands	41	118,720	1	18	.....	2	20	54,787	1
Poland	69	100,220	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Roumania	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Spain	1	8,200	3	.....	.....	.....	.....	.....	.....
U. S. S. R.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Yugoslavia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Total Europe	435	1,125,606	107	269	6	182	459	1,175,338	44
AFRICA:									
Algeria	6	29,200	4	10	.....	10	20	43,350	.....
Egypt	20	78,876	6	7	.....	10	17	69,830	2
Morocco	57	174,450	7	11	.....	45	56	216,240	1
Other Africa	2	13,100	2	.....	.....	2	2	11,700	n.a.
Total Africa	85	295,626	19	28	.....	67	95	341,120	3
MIDDLE EAST:									
Bahrein Island	.....	.....	1	2	.....	.....	2	4,600	.....
Iran	6	35,608	5	5	.....	1	6	59,183	8
Iraq	10	39,232	9	9	.....	.....	9	29,939	3
Kuwait	24	116,112	9	49	.....	.....	49	246,773	10
Lebanon	1	10,059	.....	.....	.....	.....	.....	.....	.....
Qatar	3	16,200	1	.....	.....	.....	.....	.....	.....
Saudi Arabia	24	157,363	7	19	1	3	23	152,460	5
Syria	1	8,666	2	.....	.....	.....	.....	.....	.....
Turkey	.....	.....	2	.....	.....	.....	.....	.....	5
Total Middle East	69	383,240	36	84	1	4	89	492,955	31
FAR EAST:									
British East Indies (Brunei & Sarawak)	18	98,556	8	15	1	4	20	111,035	4
China (including Formosa)	7	n.a.	3	.....	.....	.....	.....	.....	.....
India and Pakistan	n.a.	n.a.	5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Japan	50	100,010	15	34	9	29	72	163,284	33
Netherlands East Indies	103	375,221	32	96	7	12	115	383,035	22
Papua	1	12,621	2	.....	.....	2	2	5,100	2
Philippines	2	3,732	1	.....	1	.....	1	7,700	.....
Total Far East	181	590,140	66	145	18	47	210	670,154	61
OCEANIA:									
Australia	1	3,256	1	.....	.....	.....	.....	.....	.....
New Zealand	.....	.....	.....	1	.....	.....	1	2,300	.....
Total Outside United States	**3,107**	**11,351,157**	**644**	**2,274**	**252**	**876**	**3,404**	**12,801,716**	**398**
UNITED STATES[3]	40,010	137,103,025	4,909	21,745	2,990	12,609	39,047	138,098,176	4,355
WORLD TOTAL	**43,117**	**148,454,182**	**5,553**	**24,019**	**3,242**	**13,485**	**42,451**	**150,899,892**	**4,753**

[1] Footage of gas well not available. [2] Western Canada only. [3] U. S. total includes input wells, disposal wells, and old wells drilled deeper, which totaled 2,562, in 1948 and 1,703 in 1949. n.a. Not available.

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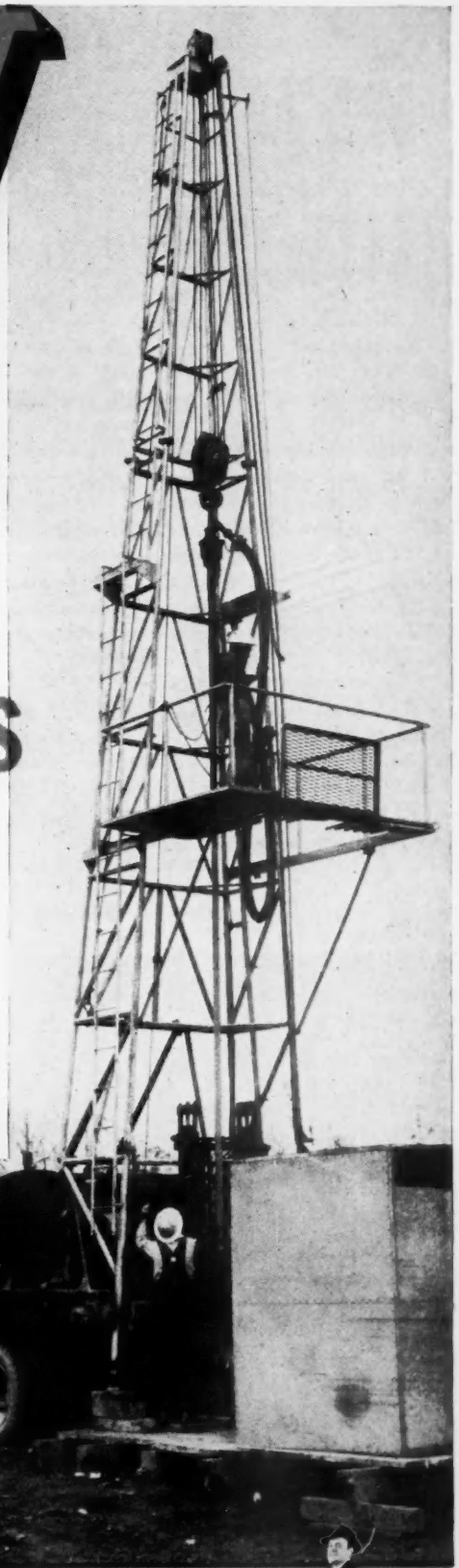

This family of fast, highly mobile oil field drills—the JOY 225, 250 and 275 Motorized Drill Rigs—are built for deep structure-testing and water-well work, or shallow slim hole production, down to 3000 feet. They are truck or trailer-mounted units with interchangeable parts, reversible rotary mechanism, single or compound engine drive, hydraulic or ordinary feed. An exclusive feature of the 225 and 250 Drill Rigs is the JOY Automatic Hydraulic Chuck, a proved labor saver — reduces costs, increases speed, actually can mean as much as 200′ more hole per day. ● *Ask for complete details.*

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WORLD PRODUCING WELLS

THE number of producing oil wells in the world probably increased by about 12,000 during 1949. There are so many countries which no longer present figures on this work that it would be pointless to attempt to tabulate the wells in the tables.

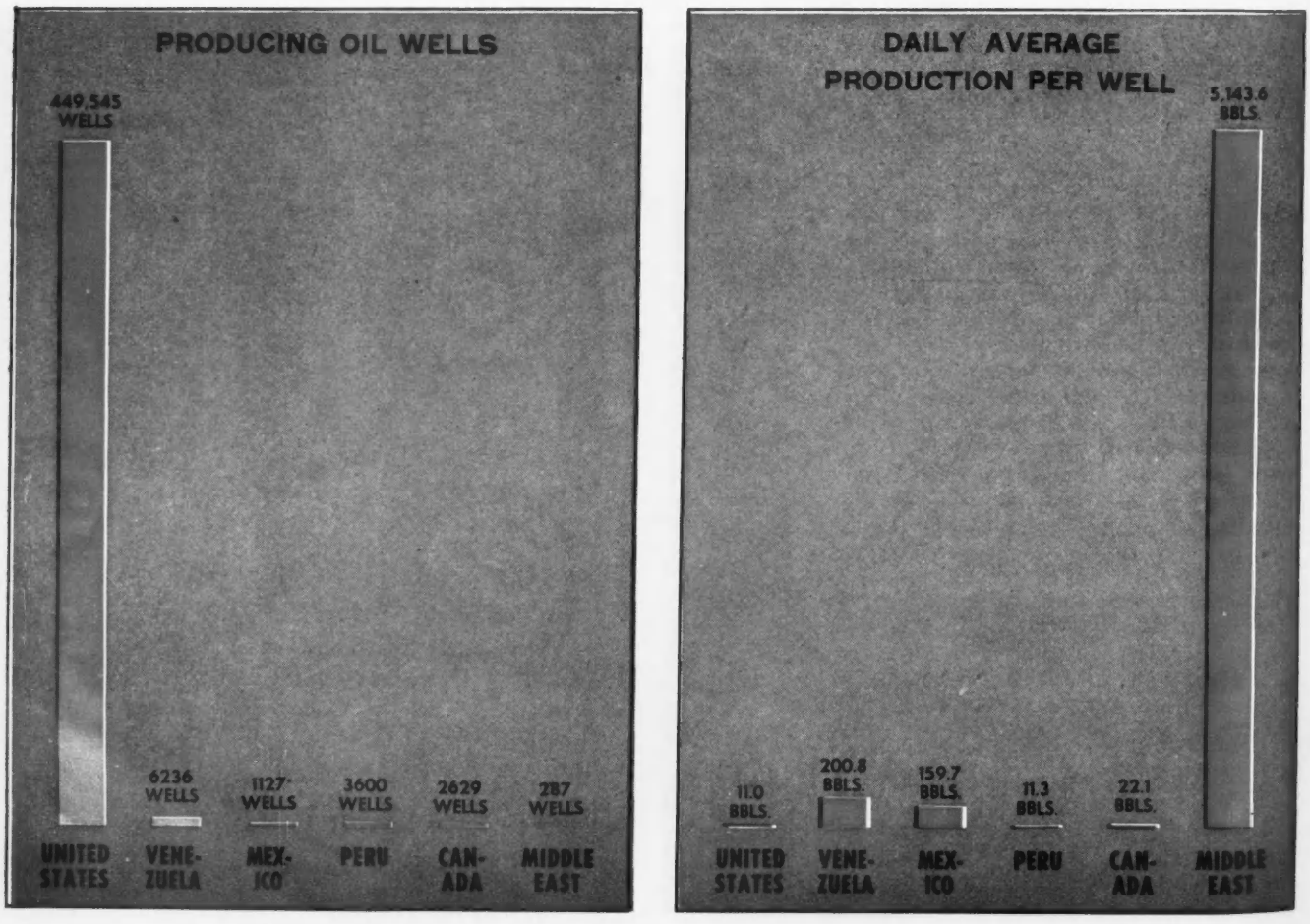
The U. S. had an increase of 9582 producing wells, Canada gained 881, Venezuela 201, and the Netherlands East Indies 359. The other countries, reported and unreported, would probably make up the remainder of 1977 new producers. The U. S. maintains a fairly even rate of increase in producing wells over the years. At the end of the year there were 449,545 producing wells as compared with 439,963 at the end of 1948. The gain in new producers was 11,441 in 1948 but this was a period of unusual development in the U. S. and 1949 saw a general program of retrenchment to stabilize supply. Another reason for fewer U. S. producing wells being added last year was the fact that deeper drilling was carried on and the drilling rigs made fewer moves.

Only 51,254 wells in the U. S. are flowing, or 11.4 percent of the total producing wells. At the end of the year, with daily production of 4,942,550 barrels, the nation's wells averaged 11 barrels per well per day. This compares with 12.9 barrels per well per day for 1948, 12.3 barrels in 1947, and 11.1 barrels in 1946. Compared with other oil producing countries of the world the U. S. is near the bottom of the list on per-well yield. For example, Iraq produces 11,200 barrels per well daily, Iran produces 8191.8 barrels per well daily, Saudi Arabia 6083.7 barrels, Kuwait 4446.9 barrels, Venezuela 200.8 barrels, Mexico 159.7 barrels and Canada 22.1 barrels per well daily. In Canada's case, the average would be much higher but the Dominion shuts in many of its producing wells upon completion because of lack of outlet for the oil.

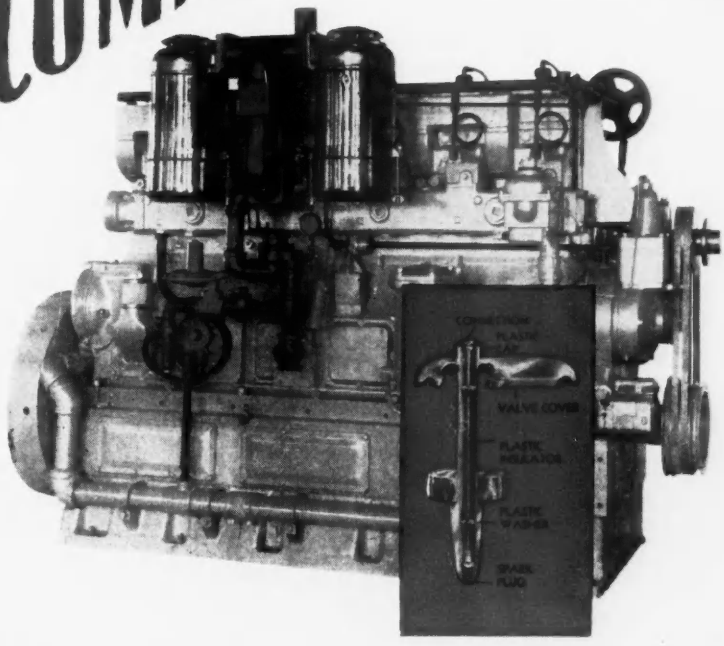
Most of these countries do not have the spacing rules and proration schedules affecting U. S. fields, nor do they have producing fields as old as some of the U. S. fields which are operating on a stripper basis, at a profit. Another important factor, especially in Iraq, Iran, Saudi Arabia, Kuwait and Mexico, is that entire fields are operated by a single company, and equitable spacing rules are not needed to insure, for the operator, an equitable share of the production. All the production of Iraq and Mexico is under one-company control, and only enough wells are drilled to adequately drain the reservoirs. In many instances in the U. S. more wells have been drilled than would be necessary to drain a reservoir efficiently. Recognizing this early failing of numerous operators in a small field has led to unitization programs in recent years which will do much toward reducing needless drilling.

Despite localized high average daily yields per well, such as the Middle East countries, the world average for 1949 was probably about 21 barrels per well—about the same as 1948. The averages for many parts of Europe and Asia are not available but the figure does not change abruptly from year to year. This low average is maintained by the older fields of South America, Europe and Asia. While many of these fields have few producing wells, the amount of production is also very small, and any oil brought to the surface is considered an asset. Canada now appears to be producing at the

Producing Oil Wells and Daily Output of Principal Areas, End of 1949



Now Available— CUMMINS NATURAL GAS-BUTANE LI-600 ENGINES



New "spark-adapter" permits easy installation of plugs for use of natural gas-butane fuel in Cummins Model LI-600. Lower compression ratio assures even greater reserve life than when engine operates as a diesel.

When burning 1,000 BTU gas or 78 octane gasoline, the engine will produce 280 horsepower max. SERVICE: Engine is designed for simple and inexpensive servicing with each part a separate unit to be removed as unit for inspection and service. COOLING: "Tropical Cores" in the radiators, designed for use in present radiators, provide ample cooling. LUBRICATIONS: Complete pressure lubrication system.

Simplicity is the keynote of the new "Spark plug adapter" which permits easy installation of plugs for use of Natural Gas or Butane fuel.

The advanced and improved design of the fuel system used in the Cummins LI-600 Natural Gas-Butane engine guarantees smooth, efficient and economical operation, along with the dependability for which Cummins engines are world-famous.

SERVICE: Cummins engines are designed for simple and inexpensive servicing. Each element of the engine is made into an individual unit that can be removed — as a unit — for service. This includes upper rocker arms, lower rocker arms, cylinder heads, removable liners, precision type bearings and the overhead valves. Large hand hole plates are removed to permit accessibility to the connecting rods and main bearings, which can be lifted out without taking the engine from the crankcase or the base-type oil pan.

COOLING: Ample cooling is provided by use of "Tropical Cores" in the radiators which were designed for Diesel operation. These radiators are extremely heavy in construction and include cast iron tanks with steel side members with removable radiator section. Cleaning the cores is simple due to removability and the cast iron headers.

LUBRICATION: The engine is completely lubricated by pressure from an oil pump mounted on the front gear case. It can be removed quickly and easily for service. Full pressure lubrication assures an ample supply of oil to all working parts under all variations of speed and load.

SPECIFICATIONS: The six-cylinder engine has a 7" bore and 10" stroke. Crankshaft is 5½" in diameter and is mounted in copper lead bearings. Engine was designed for compression pressure of 500 lbs. to the square inch when operating on Diesel fuel. This is an important factor in longer engine life when natural gas-butane is used since the pressure under these circumstances is lowered to 120 lbs. per square inch. Rollers are used on all upper and lower cam rocker levers. Weight of the engine is 10,400 pounds with radiator but less PTO.

This new natural gas-butane type engine is a development of Cummins Sales & Service, Inc., Fort Worth, Texas.

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WORLD PRODUCING WELLS—Continued

world average rate, but actually the wells in the Dominion do not produce at a fourth of their maximum efficient rates. Large-scale production in Canada has only been developed in the past four years and daily average production per well will probably be on the order of 100 barrels when the Dominion completes adequate transportation for the oil to the markets. Canada is not yet self-sufficient in oil, largely because of transportation bottlenecks, but the country intends to supply its own needs in a very short time.

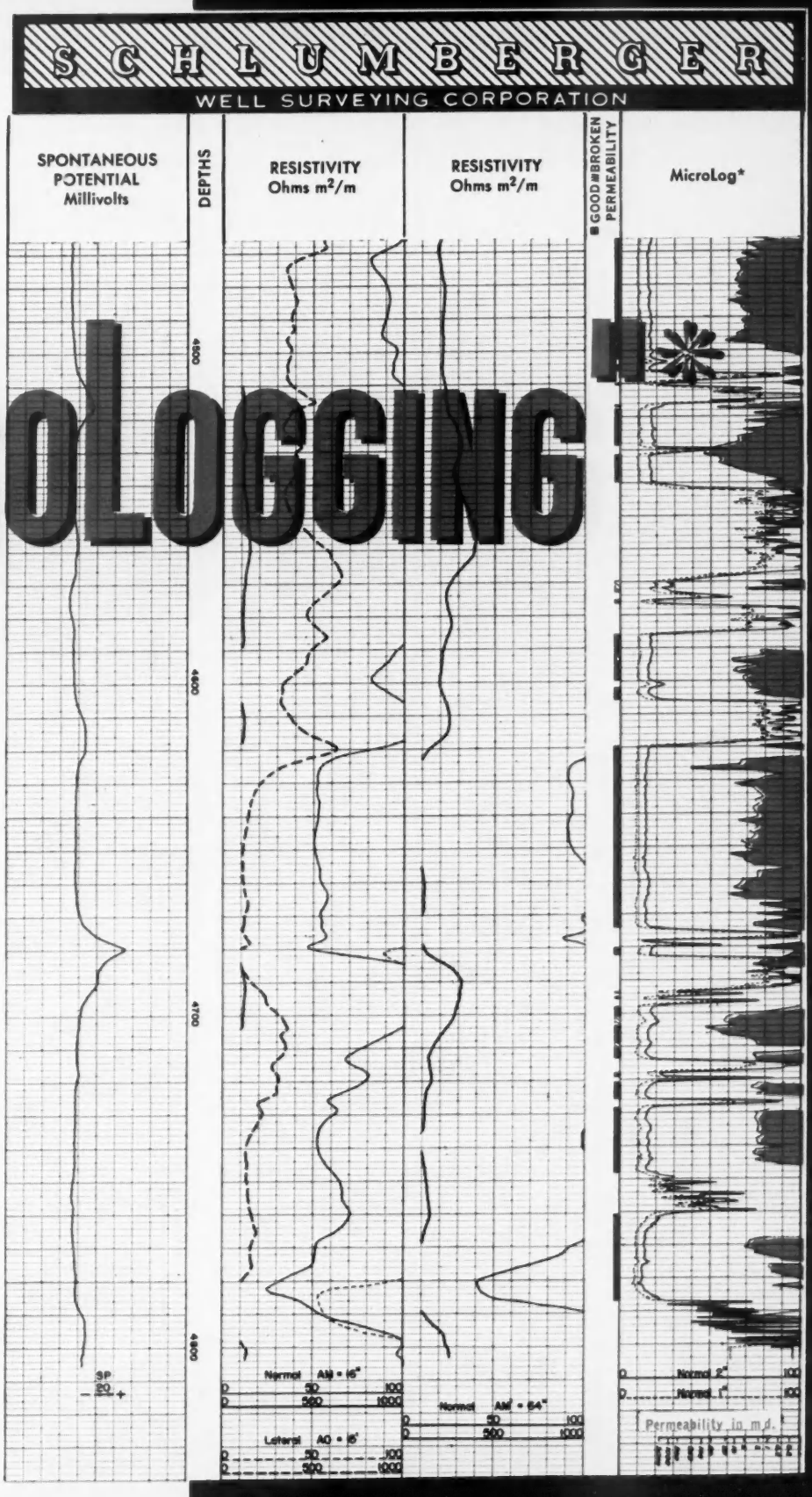
An upward trend in world daily average yield per well may develop as the Middle East area increases output. This increase is practically assured upon the completion of two large pipe lines now being constructed from Iraq and Saudi Arabia to the Mediterranean Gulf. The Middle East wells are capable of more than doubling their output when transportation facilities are equal to the task of moving the oil. With only small improvements in transportation, the daily average production from the Middle East increased from 1,305,937 barrels at the end of 1948 to 1,476,211 barrels daily at the end of 1949, with the addition of only 22 new producing wells.

Producing Oil Wells and Daily Production, 1948 and 1949, by Countries

COUNTRY	Total Producing Oil Wells End of 1948	Daily Average Production End of 1948	PRODUCING WELLS AND THEIR OUTPUT AT END OF 1949				
			Flowing	Artificial Lift	Total Producing	Daily Average Production	Barrels Daily Per Well
NORTH AMERICA, Except United States:							
Canada	1,748	40,907	n.a.	n.a.	2,629	58,016	22.1
Mexico	1,052	161,134	n.a.	n.a.	1,127	179,933	159.7
Total North America, Outside United States	2,800	202,041	n.a.	n.a.	3,756	237,949	63.4
WEST INDIES:							
Cuba	n.a.	306	n.a.	n.a.	n.a.	441	n.a.
Trinidad	2,148	55,921	672	1,553	2,225	54,921	24.7
Total West Indies	2,148	56,227	.....	.....	.....	55,362	.....
SOUTH AMERICA:							
Argentina	3,047	71,765	7§	1,325§	1,332§	63,170	47.4
Bolivia	29	1,267	12	15	27	1,854	68.7
Brazil	71	478	17	70	87	400	4.6
Chile	Shut in	.....	14	.....	14	2,000	142.9
Colombia	1,165	81,453	123	1,070	1,193	82,771	69.4
Ecuador	771	7,133	n.a.	n.a.	808	7,164	8.9
Peru	3,465	39,394	285	3,315	3,600	40,537	11.3
Venezuela	6,035	1,322,817	2,708	3,528	6,236	1,252,482	200.8
Total South America	14,583	1,524,307	3,166	9,323	13,297	1,450,378	109.1
EUROPE:							
Albania	n.a.	978	n.a.	n.a.	n.a.	3,425	n.a.
Austria	647	15,604	n.a.	n.a.	647	20,965	32.4
Czechoslovakia	n.a.	511	n.a.	n.a.	n.a.	572	n.a.
France	667	1,020	6	688	694	1,340	1.9
Germany	1,583	13,270	154	1,658	1,812	18,049	10.0
Great Britain	242	923	.....	238	238	896	3.8
Hungary	182	9,495	n.a.	n.a.	n.a.	9,235	n.a.
Italy	n.a.	177	n.a.	n.a.	n.a.	175	n.a.
Netherlands	77	11,360	n.a.	n.a.	94	11,700	124.5
Poland	2,468*	2,714*	n.a.	n.a.	n.a.	2,726	n.a.
Roumania	n.a.	80,601	n.a.	n.a.	n.a.	79,452	n.a.
U. S. S. R. (Including Sakhalin)	n.a.	583,606†	n.a.	n.a.	n.a.	640,068	n.a.
Yugoslavia	n.a.	1,100†	n.a.	n.a.	n.a.	1,041	n.a.
Total Europe	5,866	721,359	.....	.....	.....	789,644	.....
AFRICA:							
Algeria	5	2	n.a.	n.a.	n.a.	5	n.a.
Egypt	129	42,508	32	77	109	44,338	406.8
Morocco	25	276	15	20	35	717	20.5
Total Africa	159	42,786	47	97	144	45,060	312.9
MIDDLE EAST:							
Bahrein Island	64	29,984	n.a.	n.a.	67	30,097	449.2
Iran	77	551,000	n.a.	n.a.	73	598,000	8,191.8
Iraq	12	46,304	10	n.a.	10	113,000	11,200.0
Kuwait	37	212,000	61	.....	61	271,258	4,446.9
Qatar	Shut in	.....	.....	.....	n.a.	n.a.	n.a.
Saudi Arabia	70	466,400	n.a.	n.a.	76	462,363	6,083.7
Turkey	3	249	n.a.	n.a.	n.a.	2,493	n.a.
Total Middle East	265	1,305,937	.....	.....	287	1,476,211	5,143.6
FAR EAST:							
British East Indies (Sarawak and Brunei)	254	62,090	57	196	253	76,180	301.1
Burma	n.a.	820	n.a.	n.a.	n.a.	712	n.a.
China and Formosa	19	1,500	n.a.	n.a.	n.a.	1,419	n.a.
India and Pakistan	n.a.	6,803	n.a.	n.a.	n.a.	7,906	n.a.
Japan	3,712	2,776	n.a.	n.a.	3,164	4,202	1.3
Netherlands East Indies, (Borneo, Ceram, Java, New Guinea, Sumatra)	1,114	83,477	674	799	1,473	130,819	88.8
Total Far East	5,099	157,466	.....	.....	.....	221,238	.....
OCEANIA:							
Australia	n.a.	3	n.a.	n.a.	n.a.	5	n.a.
Total Oceania	n.a.	3	n.a.	n.a.	n.a.	5	n.a.
Total Outside United States‡	**30,920**	**4,010,126**	**n.a.**	**n.a.**	**n.a.**	**4,275,847**	**n.a.**
UNITED STATES	439,963	5,675,523	51,254	398,291	449,545	4,942,550	11.0
TOTAL WORLD‡	**470,883**	**9,685,649**	**n.a.**	**n.a.**	**n.a.**	**9,218,397**	**n.a.**

* To end of June, 1948. ‡ Based on available data. n.a. Data not available. † Estimated. § Incomplete information.

"MicroLogging



• ANOTHER SCHLUMBERGER DEVELOPMENT FOR THE OIL PRODUCING INDUSTRY

"MicroLogging"* is a new electrical logging method developed by Schlumberger to measure the resistivity of small volumes of material near the wall of the bore hole. "MicroLogging"* is used to provide a very detailed record of the formations and particularly of the permeable beds traversed by the bore hole. It is used today to obtain the "sand count," but research has not stopped on "MicroLogging."* Schlumberger engineers in the field and scientists in the laboratories are continuing to explore further possibilities of "MicroLogging."* This coordinated teamwork will continue to develop new and improved electrical logging techniques in years to come.

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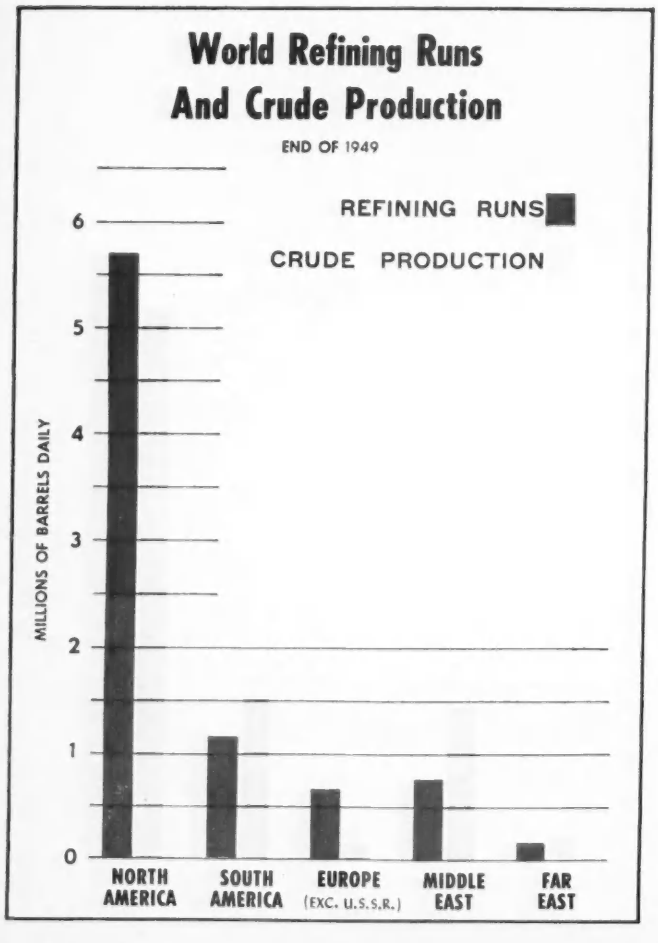
WORLD REFINING

DAILY crude runs to stills in the world at the end of 1949 were 9,299,067 barrels, with daily production at the same time being 9,218,392 barrels. With the world drawing on stocks to the amount of 81,000 barrels daily, some of the surpluses built up in 1948 are still effective.

The refining table reveals the various countries' positions in the movement of world oil. Canada's crude runs to stills are 224,617 barrels more per day than the country produces. This deficit is made up with imports from the U. S. and Venezuela to the amount of about 190,000 barrels daily, evenly divided between the two countries, and the remainder being made up with imports from Mexico, Trinidad, Iran and the Persion Gulf. On the other hand, Venezuela produces 1,081,182 barrels more than it refines each day. This surplus oil is exported largely to North America, with other countries in South America and most of Western Europe absorbing the rest.

At the end of 1949, North America, with 403 plants in operation, was refining 61.5 percent of the world's crude runs daily. The U. S. has 351 plants operating, which were handling 57 percent of the world's crude runs at the end of the year. The U. S. became a net imported of petroleum in 1949. The extent of its imports is readily apparent from its daily crude runs to refineries of 350,183 barrels more than the daily domestic production. The bulk of these imports was from Venezuela, with the remainder coming from the Persian Gulf, Iran, Colombia and Mexico. Being more than self-sufficient in oil, the U. S. imports crude not as a matter of necessity but as a balance of trade with dollar-short countries depending upon oil as a major exportable commodity.



South America's 56 plants were processing 1,168,967 barrels of crude daily at the end of 1949. These daily runs are 336,332 barrels less than the daily production; however, Colombia exports more than half its production to North America, and Venezuela exports about 91 percent of its production to areas outside of South America. Because of this, South America must import about 792,000 barrels daily from sources outside the continent to maintain the present refinery throughput.

The figures for the USSR are estimates based on the best available information, and indicate that the 27 plants in operation refine only 7.3 percent of the world total. Daily production being less than daily refinery throughput does not present a complete picture of Soviet imports.

World Refining Runs (End of 1949)

CONTINENT and COUNTRY	Number of Plants	Daily Crude Runs to Stills (Barrels)*	Daily Crude Production (Barrels)
NORTH AMERICA:			
Canada	39	282,633	58,016
Cuba	3	5,333	441
Mexico	10	136,400	179,933
United States	351	5,292,733	4,942,550
Total North America	403	5,717,100	5,180,940
SOUTH AMERICA:			
Argentina	18	93,333	63,170
Bolivia	4	1,667	1,854
Brazil	8	2,000	400
Chile	..	.....	2,000
Colombia	2	20,433	82,771
Ecuador	2	5,100	7,164
Netherlands West Indies	3	757,833	.....
Peru	4	34,733	40,537
Trinidad	4	68,867	54,921
Uruguay	1	13,700	.....
Venezuela	10	171,300	1,252,482
Total South America	56	1,168,967	1,505,299
WESTERN EUROPE:			
Belgium	4	7,067	.....
Denmark	1	633	.....
France	14	252,200	1,340
Western Germany	30	38,333	18,049
Italy and Trieste	12	62,600	175
Netherlands	1	5,700	11,700
Portugal	1	5,000	.....
Sweden	3	11,500	.....
United Kingdom	16	134,667	896
Total Western Europe	82	569,000	32,160
Other Eastern Europe	59	107,000	117,416
Total Europe	141	676,000	149,576
U. S. S. R.	27	679,000	640,068
MIDDLE EAST:			
Bahrein Island	1	156,300	30,097
Iran	2	482,400	598,000
Iraq	5	7,000	112,000
Kuwait	1	21,933	271,258
Lebanon	1	10,233	.....
Saudi Arabia	1	108,367	462,363
Turkey	2	n.a.	2,493
Israel	1	7,467	.....
Total Middle East	14	793,700	1,476,211
FAR EAST:			
China	2	1,200	1,419
India-Burma-Pakistan	6	8,233	8,618
Japan	17	4,400	4,202
Netherlands East Indies	5	179,567	206,999
Total Far East	30	193,400	221,238
OTHER AFRICA:			
Canary Islands	1	15,000	.....
Egypt	1	41,500	44,338
French Morocco	1	400	717
Total Other Africa	3	56,900	45,055
OCEANIA:			
Australia	3	14,000	5
TOTAL WORLD	677	9,299,067	9,218,392

* Figures from Bureau of Mines "World Petroleum Statistics" for Nov., 1949.

CHAPTER ONE in the Fascinating Story of the Search for Oil

In 1859 Historically, the petroleum industry of the United States dates from the Drake Well, completed August 29, 1859, at Oil Creek, Pennsylvania. The Drake Well was drilled because of nearby oil springs by men whose entire knowledge of the occurrence of petroleum could have been no greater than that it was a substance which could sometimes be skimmed from the flow of springs. Thus, the first successful prospecting in the petroleum industry was based on direct indications—on the age-old mining principle of seeking in the subsoil substantial quantities of a mineral found at the surface. From E. DeGolyer's Book, *"The Development of the Art of Prospecting."*

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PRINCIPAL OIL COMPANIES—Operating Outside United States

Abbreviations: A.G.—Aktiengesellschaft; C.A.—Compañía Anónima; Cía.—Compañía; Cie.—Compagnie; Co.—Company; Corp.—Corporation; G. m. b. H.—Gesellschaft mit beschrankter Haftung; Gw.—Gewerkschaft; Inc.—Incorporated; Ltd.—Limited; Mij.—Maatschappij; N.V.—Naamloose Vennootschap; Pty.—Propriatary; S.A.—Sociedad Anónima or Société Anonyme.

COMPANY	Location of Producing Fields or Concessions	OWNERSHIP
—A—		
Abasand Oil, Ltd	Canada	
Amerada Pet. Corp	Canada	American interests
American Independent Oil Co., Ltd	Kuwait Neutral Territory	Group of American Independent Companies
American International Fuel and Petroleum Co	Nicaragua	Gulf Oil Corp. and Atlantic Refg. Co.
Anglo-American Oil Co., Ltd	Great Britain	Standard (N.J.) and British interests
Anglo-Bahamian Pet. Co., Ltd	Bahamas	Anglo-Iranian Oil Co.
Anglo-Canadian Oil Co., Ltd	Canada	Canadian interests
Anglo-Eucadorian Oilfields, Ltd	Ecuador	British interests
Anglo-Egyptian Oilfields, Ltd	Egypt	Shell Group, Egyptian Government
Anglo-Iranian Oil Co., Ltd	Iran, Iraq, Kuwait, Bahamas, Great Britain, Trinidad, Egypt (Partly through subsidiaries)	British Government 52½%; Burmah Oil Co., Ltd. 25%; individuals 22½%
Antilles Pet. Co. (Trinidad), Ltd	Trinidad	McColl-Frontenac Oil Co.
Apex (Trinidad) Oilfields, Ltd	Trinidad	British interests
Arabian-American Oil Co	Saudi Arabia	Standard Oil Co. of Calif. 30%; Standard Oil Co. (New Jersey) 30%; The Texas Co 30%; Socony-Vacuum Oil Co 10%
Ashley Gold and Minerals, Ltd	Canada	Canadian interests
Assam Oil Co	India	Burmah Oil Co.
"Astra" Cía. Argentina de Petróleo S.A.	Argentina	Argentina interests
Atlantic Refining Co	Cuba, Venezuela, Haiti	Atlantic Refining Co.
Attock Oil Co., Ltd	Pakistan	Burmah Oil Co and other British interests
Australasian Pet. Co. Pty., Ltd	New Guinea	Anglo-Iranian Oil Co.; Socony-Vacuum Oil Co.
Azienda Generale Italiana Petroli	Italy	Italian Government
Azienda Italiana Petroli Albania	Albania	Italian Government
—B—		
Bahamas Oil Co., Ltd	Bahamas	Superior Oil Co. of Calif.
Bahamas Oil Exploration, Ltd	Bahamas	Gulf Oil Corp.
Bahamas Mining Co., Ltd	Bahamas	F. H Christie et al.
Bahrein Pet. Co., Ltd	Bahrein	Standard of Calif and T e Texas Co.
Basrah Petroleum Co., Ltd	Iraq	Iraq Pet. Co.
Bata Petroleums, Ltd	Canada	
N.V. Bataafsche Pet. Mij	Netherlands Indies	Shell Group
Bear Oil Co., Ltd	Canada	Tide Water, Pacific Western, Skelly Oil, Sunray Oil, Pacific Petroleums, Ltd.
Bonaparte Gulf Company, Pty., Ltd.	Australia	Vacuum Oil Co. Pty., Ltd. & Australian and British interests
Braunschweigische Bohrgesellschaft	Germany	German Government
British American Oil Co., Ltd	Canada	Canadian interests
British Bahamian Oil Dev. Co., Ltd	Bahamas	Central Mining and Investment Co.
British Controlled Oilfields, Ltd	Venezuela, Ecuador	British interests
British Malayan Pet. Co., Ltd	British Borneo	Shell Group
Burbach-Kaliwerke A.G.	Germany	
Burmah Oil Co., Ltd	Burma, India	British interests
—C—		
Caldas Pet. Co	Colombia	The Texas Co.
Calgary and Edmonton Corp., Ltd	Canada	Canadian interests
The California Standard Co	Canada	Standard of Calif.
Calmont Oils, Ltd	Canada	Canadian interests
Canadian Gulf Oil Co	Canada	Gulf Oil Corp.
Caracas Pet. S.A.	Venezuela	British interests
Carolina Oil Co	Ecuador	Ecuadorian interests
Central Area Exploration Co	Venezuela	British interests
Chinese Pet. Corp	China	Chinese Government
Colombian Pet. Co	Colombia	Socony-Vacuum Oil Co 50%; Texas Co 50%
Colón Development Co., Ltd	Venezuela	Shell Group
Commoil, Ltd	Canada	Commonwealth Pet., Ltd
Cie des Pétroles de Tunisie Shell	Tunisia	Shell Group 65%; SEREPT 35%
Cie Francaise de Pétroles	Iraq	French Government
Cía. Arrendataria del Monopolio de Petróleos S.A. (CAMPSA)	Spain	Spanish Government
Cía. Colombiana de Petróleo El Condor	Colombia	Shell Group
Cía. Consolidada de Petróleo	Venezuela	Sinclair Oil Corp.
Cía. de Petróleo del Cravo	Colombia	Tropical Oil Co.
Cía. de Petróleo Ganso Azul, Ltd	Peru	American interests
Cía. de Petróleo Gran Colombia, S.A.	Colombia	The Texas Co., Richmond Pet. Co., Socony-Vacuum Oil Co.
Cía. de Petróleo Shell de Colombia	Colombia	Shell Group
Cía. de Petróleos del Pacífico	Colombia	Socony-Vacuum Oil Co.
Cía. "El Sosneado" de Petróleo	Argentina	Argentine private interests
Cía. Espanola de Petróleos S.A. (CEPSA)	Venezuela	Spanish Interests and Creole Pet. Corp.
Cía. Espanola de Petróleos Scientificas Investigaciones	Spain	Socony-Vacuum Oil Co. and Spanish interests
Cía. Ferrocarrilera de Petróleo	Argentina	British Railways of Argentina
Cía. Peruana de Petróleo "El Oriente"	Peru	Peruvian private interests
Cía. Petrolera la Estrella de Cuba	Cuba	Shell Group
Cía. Petrolera Lobitos	Peru	Lobitos Oilfields, Ltd.
Cía. Petrolera del Zulia	Colombia	Tropical Oil Co.
Cías. Unidas de Petróleo	Colombia	Sinclair, Cities Service and Richfield
Colon Development Co	Venezuela	Shell Group
Concepción Ecuadorian Oilfields, Ltd	Ecuador	British interests
Condamine Oil Pty., Ltd	Australia	Australian interests
Conselho Nacional do Petróleo	Brazil	Brazilian Government
Corporación de Fomento de la Producción	Chile	Chilean Government
Creole Petroleum Corp	Venezuela	Standard Oil Co. (N.J.)
—D—		
Daido Oil Co	Japan	Japanese interests
Danish-American Prospecting Co	Denmark	Gulf Oil Corp.
D'Arcy Exploration Co., Ltd	England	Anglo-Iranian Oil Co., Ltd.
Decalta Oils	Canada	Canadian interests
Deilman, C (formerly DEUTAG)	Germany	German interests
Deutsche Erdöl A.G. (DEA)	Germany, Austria	
Deutsche Vacuum Oel A.G.	Germany	Socony-Vacuum Oil Co.
Diadema Argentina S.A. de Petróleo	Argentina	Shell Group
—E—		
Ecuador Oilfields, Ltd	Ecuador	British Controlled Oilfields, Ltd.
Ecuador Tropical Oil Co	Ecuador	Ecuadorian interests
Eguchi Oil Association	Japan	Japanese interests
Empresa Petrolera Fiscal	Peru	Peru Government
Erdol Produktions Gesellschaft	Austria	German interests
Esso Standard Oil Co. (Ecuador) S.A.	Ecuador	Standard Oil Co. (N.J.)
—F—		
Far East Development Co	Philippines	American interests
Foothills Oil and Gas Co., Ltd	Canada	Imperial Oil, Ltd. 85.2%
—G—		
Ganzo Azul Petrol Co	Peru	American interests
Gaspé Oil Ventures, Ltd	Canada	
General Petroleums, Ltd	Canada	Canadian interests
Gw. Brenner	Germany	German interests
Gw. Brigitta	Germany	Shell Group; Standard (N.J.)
Gw. Elwerath	Germany, Austria	German interests
Gw. Franz	Germany	German interests
Gw. Norddeutschland	Germany	German interests
Gw. Vereinigte Borgholzhausen	Germany	German interests
Grossdeutsche Schachtbau und Tiefbohrgesellschaft	Germany	German interests
Guasare Oil Co	Venezuela	Drilling and Exploration Co.; Lion Oil Refining Co., et al
Gute Hoffnungshutte	Germany	German interests
—H—		
Hamburger Gasgesellschaft	Germany	German interests
Hokkaido Oil Development Co	Japan	Japanese interests
Hokuriku Oil Association	Japan	Japanese interests
Home Brazeau Syndicate	Canada	Home; Anglo-Canadian; Imperial; Shell; Socony-Vacuum; Cal. Standard
Home Oil Co., Ltd	Canada	Canadian interests
Honolulu Oil Corp	Canada, Costa Rica	Honolulu Oil Co.
Hudson's Bay Oil & Gas Co., Ltd	Canada	Continental Oil Co. (Del.)
Husky Oil & Refg. Co	Canada	Husky Refg. of Wyo.
—I—		
Imperial Oil Co	Japan	Japanese interests; Japanese Government
Imperial Oil, Ltd	Canada	Standard (N.J.) 70%
Indo-Burma Pet. Co., Ltd	Burma	British interests
International Ecuadorean Pet. Co	Ecuador	Standard Oil Co. (N.J.)
International Pet. Co., Ltd	Peru, Venezuela	Standard (N.J.); holds 25% interest in Mene Grande's Venezuela production
International Tiefbohr-Kommandit Gesellschaft (ITAG)	Germany, Austria	German interests
Iraq Petroleum Co., Ltd	Iraq	Anglo-Iranian 23.75%; Shell Group 23.75%; Near East Development Co. 23 75% Cie Francaise des Pétroles 23.75%; C I Gulbenkian 5%
Ishikawa Co	Japan	Japanese interests
Island Development Co., Ltd	Canada	Cities Service Oil Co.; Socony-Vacuum Oil Co.
—J—		
Jordan Exploration Co., Ltd	Palestine	British interests
—K—		
Kaliwerke Salzdetfürth	Germany	
Karuta Industrial Co	Japan	Japanese interests
Kermanshah Pet.Co., Ltd	Iran	Anglo-Iranian Oil Co., Ltd
Kern Trinidad Oilfields, Ltd	Trinidad	Kern Oil Co., Ltd
Khanaqin Oil Co., Ltd	Iraq	Anglo-Iranian Oil Co., Ltd
Khaneh Pet Co	Iraq	Iraq Pet. Co; Anglo-Iranian Oil Co.
Kohle-Öl-Union von Busse A.G.	Germany	
Koller, Ferd, and Sohn	Germany	German interests
Kuwait Oil Co., Ltd	Kuwait	Gulf Exploration Corp. 50%; Anglo-Iranian 50%

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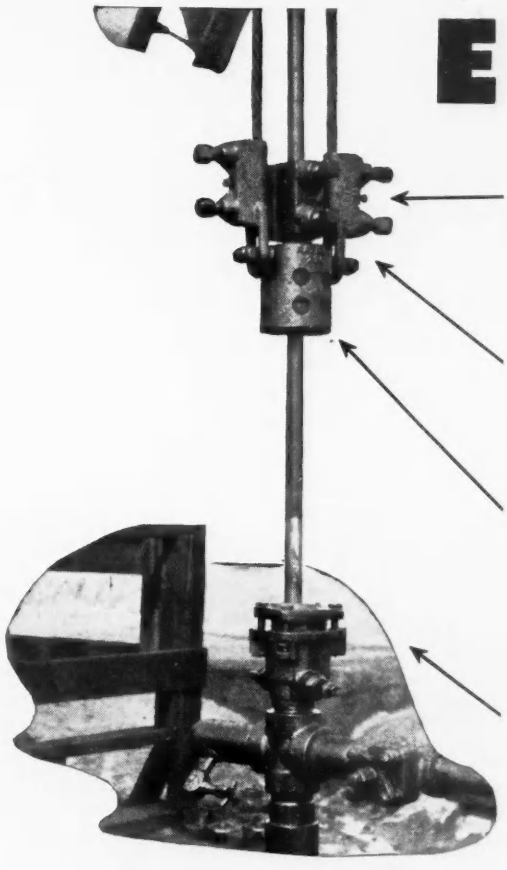

RATIGAN NO. 219 WIRE LINE CLAMP will take any size wire line from ¾" to 1¼" inclusive, and eliminates babbitting. It is designed for any trunnion type pumping equipment, such as carrier bars, or polish rod grips used in connection with horseheads or bridles on pumping wells. It is a perfect unit for use in combination with our No. 220 Shock Absorber.

RATIGAN NO. 204 POLISH ROD GRIP consists of three parts . . . the body, connecting block, and gate. It will accommodate all the carrier bars supplied by manufacturers of unitized pumping equipment. It has an approximate holding capacity of 53,000 lbs., yet weighs only 19 lbs.

RATIGAN NO. 220 SHOCK ABSORBER is new and especially designed for pumping units that are limited to width and headroom. It is a combination carrier bar and shock absorber, and used with horseheads that have 7" to 9" centers. It greatly reduces the breakage of sucker rods and polish rods, and is also very beneficial to the motors, engines and gears by cushioning the impact of the well on the reversal of the stroke. It also helps when the well is pounding fluid.

RATIGAN NO. 176 STUFFING BOX is a self-oiling unit receiving its lubrication directly from the pumping well. Its construction is such that polish rods are self-aligning . . . an important feature. Only high quality grade electric steel has been used, and the unit has been tested to 3,000 lbs. pressure.

This "Ratigan Equipped" well clearly shows how these products meet the urgent need for higher efficiency and safety in today's oil field operation. They are the finest in design, engineering and materials, and have been proved by many years of top performance under the most severe operating conditions. Specify Ratigan "Sure-Grip" Oil Well Pumping Equipment.

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POLISH ROD GRIPS AND CLAMPS
SPRING SUCKER ROD HOOKS
SUCKER ROD ELEVATORS
SPRING SWIVEL LINKS AND "C" LINKS
OIL-LESS BEAM ROCKERS AND STIRRUP BEARINGS
TUBING ELEVATORS
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PRINCIPAL OIL COMPANIES—Operating Outside United States

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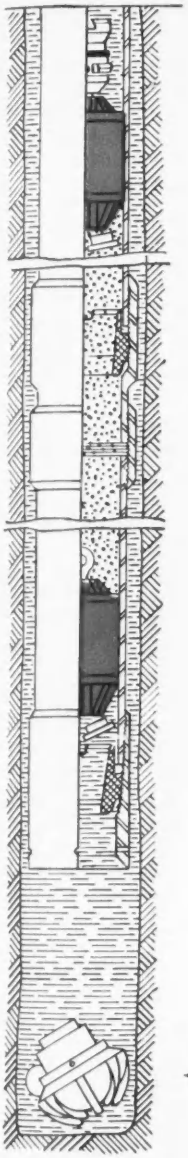
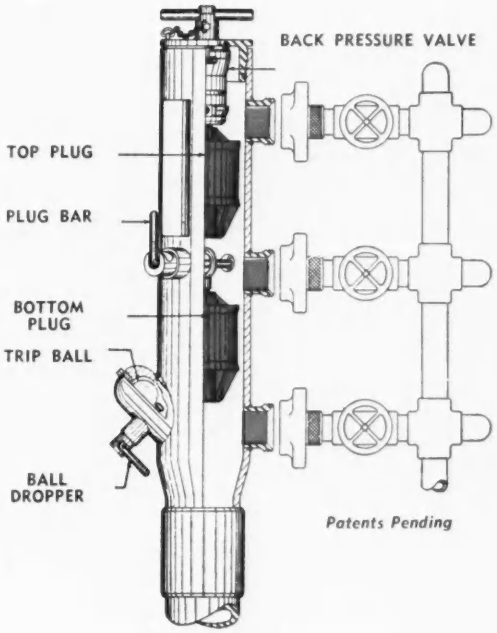
COMPANY	Location of Producing Fields or Concessions	OWNERSHIP
—L—		
La Junta Pet. Co.	Colombia	The Texas Co.
Lebanon Pet. Co., Ltd.	Lebanon	Iraq Pet. Co.
Lion Oil Refining Co.	Canada	American interests
—M—		
MacMillan Pet. Corp.	Sicily	American interests
Maden Tetkik ve Arama Enstitusu	Turkey	Turkish Government
Magyar Amerikai Olajipari Részvénytársaság (MAORT)	Hungary	Standard Oil Co. (N.J.)
McColl-Frontenac Oil Co., Ltd.	Canada	The Texas Co. 50%
Mene Grande Oil Co., C.A.	Venezuela	Gulf Oil Corp.
Mexican Gulf Oil Co.	Mexico	Gulf Oil Corp.
Mexico-Cities Service Pet. Corp.	Mexico	Cities Service Co.
Mosul Pet. Co., Ltd.	Iraq	Iraq Pet. Co.
Mozambique Gulf Oil Co.	Mozambique	Gulf Oil Corp.
Murilla Oil, Ltd.	Australia	Australian interests
Muskeg Syndicate	Canada	Gulf, Shell, Imperial, Socony-Vacuum, McColl-Frontenac
—N—		
Nassau Oil Mining Co., Ltd.	Bahamas	British interests
National Mining Corp., Ltd.	Trinidad	British interests
Naval Petroleum Reserve Operating Committee	Alaska	U. S. Government
Near East Development Corp.	Iraq (Owns interest in Iraq Pet. Co.)	Standard Oil Co. (N.J.); Socony-Vacuum Oil Co. 50% Standard (N.J.)
N. V. Nederlandsche Aardolie Mij.	Netherlands	50% N. V. de Bataafsche Pet. Mij. (Shell)
Nederlandsche Indische Aardolie Mij.	Sumatra	50% Shell Group; 50% Netherlands Govt.
Nederlandsche Nieuw Guinee Pet. Mij.	Netherlands New Guinea	40% Shell Group; 40% Standard-Vacuum; 20% Standard of Calif.-The Texas Co.
Nederlandsche Pacific Pet. Mij.	Netherlands Indies	Standard of Calif. 50%; The Texas Co. 50%
New Brunswick Oilfields, Ltd.	Canada	American and Canadian interests
Niederdonau Erdöl G. m. b. H.	Austria	DEA, Wintershall, Pressag, Elwerath Co's.
Nippon Mining Co.	Japan	Japanese interests
North Venezuelan Pet. Co., Ltd.	Venezuela	British interests
Nova Scotia Oil and Gas Co., Ltd.	Canada	.....
—O—		
Okalta Oils, Ltd.	Canada	Canadian interests
Oldenburger Erdöl G. m. b. H.	Germany	Standard (N.J.) 33⅓%; Socony-Vacuum 33⅓%; Shell 33⅓%
Orinoco Oil Co. of Venezuela	Venezuela	Pure Oil Co.
—P—		
Pacific Petroleums, Ltd.	Canada	Canadian interests
Pacific Western Oil Corp.	Canada	American interests
Pancoastal Oil Co., C.A.	Venezuela	Pantepec Oil Co. of Venezuela, C. A.
Pantepec Oil Co., C. A.	Venezuela	Pantepec Oil Co. of Venezuela, C. A. (American)
Pechelbronn S.A. d'Exploration Miniere	France	French Government
Peninsular Oil Corp., Ltd.	Canada	.....
Petróleos Ariguani S.A.	Colombia	50% Tropical Oil Co.; 50% Colombia interests
Petróleos Mexicanos (Pemex)	Mexico	Mexican Government
S.A. Petrolera las Mercedes	Venezuela	The Texas Co. 50%; Caracas Pet. Co. 50%
Petroleum Concessions, Ltd.	Hadhramaut and Aden	Iraq Pet. Co.
Petroleum Development Ltd.	Cyprus, Oman & Dhofar, Palestine, Qatar, Trucial Coast	Iraq Pet. Co.
Petrópolis Oil Co.	Ecuador	Ecuadorian interests
Phillips Petroleum Co.	Canada	Phillips Pet. Co.
Phillips Venezuelan Oil Co.	Venezuela	Phillips Pet. Co.
Pictou Pet. Co., Ltd.	Canada	.....
"Pram" Erdöl Explorations G. m. b. H.	Austria	.....
Premier (Trinidad) Oilfields, Ltd.	Trinidad	British interests
"Preussag" Preussische Bergwerke und Hütten A. G.	Germany	German Government
Princess Brooks Syndicate	Canada	Canadian and American interests
—Q—		
Quaich Oil Corp., Ltd.	Canada	Canadian interests
—R—		
Ram River Oils, Ltd.	Canada	Canadian interests
Régie Autonome des Pétroles (RAP)	France	French Government and private interests
Richmond Exploration Co.	Venezuela	Standard Oil Co. of Calif.
Richmond Pet. Co. of Calif.	Colombia	Standard Oil Co. of Calif.
Ritz, Louis and Co.	Germany	.....
Roboel Gewinnungs A.G. (RAG)	Austria	Socony-Vacuum Oil Co. 50%; Shell Group 50%
Roxana Oil Co., Ltd.	Canada	Canadian interests
Royalite Oil Co., Ltd.	Canada	.....
S		
Saito Oil Company	Japan	Japan interests
Sarawak Oilfields, Ltd.	Sarawak	Shell Group
Schachtbau and Tiefbohr-Gesellschaft	Germany	German Government
Shell Caribbean Pet. Co.	Venezuela	Shell Group
Shell Exploration New Brunswick	Canada	Shell Group
Shell Oil Co. of Canada, Ltd.	Canada	Shell Group
Shell Co. of Ecuador, Ltd.	Ecuador	Shell Group
Shell Co. of Egypt, Ltd.	Egypt	Shell Group
Shell Overseas Exploration Co., Ltd.	Bahamas	Shell Group
Shell (Queensland) Dev. Pty., Ltd.	Australia	Shell Group
Shunda Oils, Ltd.	Canada	.....
Sinclair Oil Co. of Venezuela	Venezuela	Sinclair Oil Corp.
Sinclair Pet. Co., Ltd.	Ethiopia	Sinclair Oil Corp.
Sindicato Ganadero Colombiano	Colombia	The Texas Co.
Siparia Trinidad Oilfields, Ltd.	Trinidad	British interests
Sociedad Anónima Petrólera Las Mercedes	Venezuela	The Texas Co. 50%; Caracas Pet. 50%
Sociedad De Fomento Petrolero	Colombia	Socony-Vacuum Oil Co.
Società Idrocarburi Nazionale	Italy	Italian interests
Società Italiana del Petrolio Affini	Italy	Shell Group
Società Petroli d'Italia	Italy	Italian interests
Società Petrolifera Italiana (SPI)	Italy	Standard Oil Co. (N.J.)
Société Chérifienne des Pétroles	Morocco	French and Morrocan Governments
Société d'Etudes et Recherches Pétrolières en Tunisie (SEREPT)	Tunisia	French and Tunisian Governments
Société Nationalé d'Etudes et de Recherches Pétrolieres en Algerie	Algeria	French and Algerian Governments
Société Nationale des Pétroles D'Aquitaine	France	French Government 55%; French Interests 45%
Société Nationale des Pétroles du Languedoc Mediterraneén	France	French Government 55%; French interests 45%
Société Nord-Africaine des Pétroles Gulf	Tunisia	Gulf Oil Corp. 65%; (SEREPT) 35%
Socony-Vacuum Oil, C.A.	Venezuela, Colombia	Socony-Vacuum Oil Co.
Socony-Vacuum Oil Co., Inc.	Egypt	Socony-Vacuum Oil Co.
Socony-Vacuum Exploration Co.	Canada	Socony-Vacuum Oil Co.
Socoro Petroleum Co.	Colombia	The Texas Co.
Sobio Oil Co.	Canada	American Co.
Soviet Mineral Oil Administration	Austria	U. S. S. R.
Sovmagnafta Co.	Hungary	Hungarian Government 50%; U.S.S.R. 50%
Sovrompetrol Oil Co.	Roumania	Russian and Roumanian Governments
Standard Amerikaansk Pet. Co.	Netherlands	Standard Oil Co. (N.J.)
Standard Francaise des Pétroles S.A.	France	Standard (N.J.)
Standard Oil (Bahamas), Ltd.	Bahamas	Standard Oil Co. (N.J.)
Standard Oil Co., S.A. Argentina	Argentina	Standard Oil Co. (N.J.)
Standard Oil Co. of Cuba	Cuba	Standard Oil Co. (N.J.)
Standard Pacific Synd et al.	Canada	Cal. Standard, Pacific, Princess, Empire, Homestead, Globe, Phillips, D C. McDonald
N.V. Standard-Vacuum Pet. Mij.	Netherlands Indies	Socony-Vacuum 50%; Standard (N.J.) 50%
Stanolind Oil & Gas Co.	Canada	Standard Oil Co. (Ind.)
Steinberg-Naphtha	Austria	German (ITAG, Elwerath)
Structure Drilling Co.	Canada	.....
Sun Oil Company, Ltd.	Canada	Sun Oil Co. (American)
Sunray Oil Co.	Canada	American Co.
Superior Oils, Ltd.	Canada	Canadian interests
Sydney Pet. Co.	Canada	.....
Syrian-American Oil & Gas Co.	Syria	J. W. MenHall
Syria Pet. Co., Ltd.	Syria	Iraq Pet. Co.
—T—		
Tampico Texas Pet. Corp.	Canada	.....
Teikoku (Imperial) Oil Co.	Japan	Japanese interests
Texas Petroleum Co.	Venezuela, Colombia	The Texas Co.
Tide Water Associated Oil Co.	Canada	American Co.
Tone Boring Company	Japan	.....
Transjordan Pet. Co., Ltd.	Transjordan	Iraq Pet. Co.
Trinidad Central Oilfields, Ltd.	Trinidad	.....
Trinidad Consolidated Oilfields, Ltd.	Trinidad	British interests
Trinidad Leaseholds, Ltd. (TLL)	Trinidad	British interests
Trinidad Northern Areas, Ltd.	Trinidad	UBOT, d'Arcy, TLL
Trinidad Oilfields Operating Co., Ltd.	Trinidad	Standard Oil Co. (N.J.)
Trinidad Pet. Development Co., Ltd.	Trinidad	British interests
Tropical Oil Co.	Colombia	Standard Oil Co. (N.J.)
Tubará Oil Company	Colombia	Tropical Oil Company
—U—		
Union Oil Co. of California	Canada	American interests
United British Oilfields of Trinidad, Ltd.	Trinidad	Shell Group
—V—		
R. V. Van Sickle	Austria	.....
Venezuelan Atlantic Refg. Co.	Venezuela	Atlantic Refg. Co.
Venezuela Oil Concessions, Ltd.	Venezuela	Shell Group
Venezuela Pet. Co.	Venezuela	Sinclair Oil Corp.
—W—		
Westdeutsche Bohrgesellschaft (Siep and Co.)	Germany	.....
Wintershall A.G.	Germany, Austria	.....
—Y—		
Yacimientos Petroliferos Fiscales Bolivianos (Y.P.F.B.)	Bolivia	Bolivian Government
Yacimientos Petroliferos Fiscales (Y.P.F.)	Argentina	Argentine Government

Only THE RECTOR "FULBORE" TWO PLUG CEMENTING METHOD HAS THESE ADVANTAGES





Patents Pending

Float Assembly ← and trip ball ejected

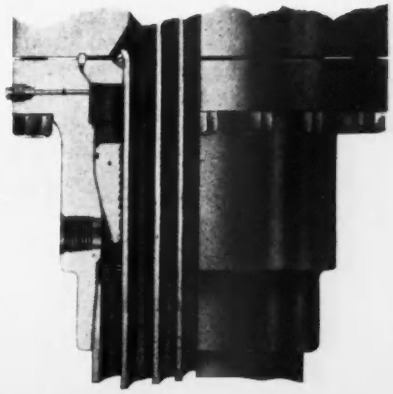
1. **Two plug method, separates the cement column from mud fluid and provides delivery of uncontaminated cement at casing shoe.**
2. **Greater casing discharge capacity at lower pressure is obtained by ejecting float assembly from shoe.**
3. **Produces uniform body of cement at the shoe and shoe joint with minimum hazard of channelling.**
4. **Positive back pressure valve that prevents back flow of cement when seated in stall collar.**
5. **Plug retainer type cement head provides closed circuit that prevents air entrainment in cement column.**
6. **Cement placement in annulus back of casing accomplished in a minimum of time.**

The above noted advantages of the Rector "FULBORE" Two Plug cementing method assure a MASTER Cementing job every time.

Ask your nearest RECTOR REPRESENTATIVE, SUPPLY MAN, OR BLACKIE CLARK WELL SERVICE COMPANY for full details about a MASTER cementing job with the "FULBORE" Two Plug Method, or write for bulletins.

NO RESILIENT SEALS OR SOFT PACKING IN RECTORHEADS

A good weld plus an API ring gasket gives Rector Casing Heads a positive, permanent, leak-proof seal for the life of the well. These seals require no maintenance or replacement . . . are heat-proof and fire-resistant . . . are immune to effects of corrosion inhibitors. Welds are easily and effectively made . . . pipe does not project above weld to interfere with setting blowout preventer or subsequent heads. Rector Casing Heads are available in 2000 to 15,000 test pressures, for slip or mandrel suspension. Be sure your wells are safe . . . use RECTORHEADS all the way from surface string to christmas tree.



RECTOR WELL EQUIPMENT CO., INC.

FORT WORTH, TEXAS

Fort Worth Plant . . . . . 1100 N. Commerce St. Houston Plant . . . . . 2215 Commerce St.

REPRESENTATIVES IN ALL ACTIVE FIELDS

RECTOR

RECTORHEAD

MAKING THE OIL INDUSTRY SAFER!

ASSOCIATION OF WELL HEAD EQUIPMENT MANUFACTURERS CERTIFIED

CONVERSION FACTORS

Crude Oil Conversion Factors

Country	BARRELS PER TON			TONS PER BARREL	
	Long Tons	Metric Tons	Short Tons	Long Tons	Metric Tons
North America:					
Canada	7.891	7.766	7.046	.12673	.12877
Mexico	7.281	7.166	6.501	.13734	.13955
United States	7.459	7.341	6.660	.13406	.13621
South America:					
Argentina	7.134	7.021	6.370	.14017	.14242
Bolivia	7.841	7.717	7.001	.12754	.12959
Colombia	7.143	7.030	6.378	.13999	.14224
Ecuador	7.707	7.585	6.881	.12975	.13183
Peru	7.661	7.540	6.840	.13054	.13264
Trinidad	7.193	7.079	6.422	.13903	.14126
Venezuela	6.958	6.848	6.212	.14372	.14603
Europe:					
Albania	6.706	6.600	5.988	.14912	.15151
Austria	6.897	6.788	6.158	.14500	.14733
Czechoslovakia	6.891	6.782	6.153	.14513	.14746
England	7.440	7.322	6.643	.13440	.13656
France	7.177	7.064	6.408	.13933	.14157
Germany	7.129	7.017	6.365	.14027	.14252
Hungary	7.754	7.631	6.923	.12896	.13103
Italy	7.800	7.677	6.964	.12821	.13027
Poland	7.526	7.407	6.720	.13288	.13501
Roumania	7.525	7.406	6.719	.13288	.13501
U.S.S.R. (Except Sakhalin)	7.390	7.273	6.598	.13532	.13749
Africa:					
Egypt	7.116	7.003	6.354	.14053	.14279
Asia (Middle East):					
Bahrein	7.446	7.328	6.648	.13431	.13647
Iran (Persia)	7.669	7.548	6.847	.13039	.13248
Iraq	7.600	7.480	6.786	.13159	.13370
Kuwait	7.482	7.364	6.680	.13365	.13580
Saudi Arabia	7.537	7.418	6.729	.13267	.13480
Asia (Far East):					
Borneo	7.345	7.229	6.558	.13614	.13833
India	7.355	7.239	6.567	.13596	.13814
Japan	7.143	7.030	6.378	.13999	.14224
Netherlands Indies	7.911	7.786	7.003	.12641	.12844
Sakhalin (U.S.S.R.)	6.930	6.820	6.188	.14430	.14662
Sarawak	6.762	6.655	6.038	.14788	.15025

API Gravity Conversion Factors

Gravity	BARRELS PER TON			TONS PER BARREL	
	Long Tons	Metric Tons	Short Tons	Long Tons	Metric Tons
28° Crude Oil	7.220	7.106	6.446	.1385	.1407
32° Crude Oil	7.401	7.284	6.608	.1351	.1373
36° Crude Oil	7.582	7.462	6.770	.1319	.1340
40° Crude Oil	7.763	7.641	6.931	.1288	.1309
44° Crude Oil	7.945	7.819	7.094	.1259	.1279

Conversion Factors for Lengths, Areas, Weight and Volumes

Acres multiplied by:
43,560 = square feet
4840 = square yards
4046.873 = square meters
0.00156 = square miles
0.00405 = square kilometers
0.4047 = hectares
5645.4 = square varas (Texas)
40.47 = ares

Atmospheres (at mean sea level) multiplied by:
14.70 = pounds per square inch
76 = centimeters of mercury
29.92 = inches of mercury

Barrels (U.S.) multiplied by:
9702 = cubic inches
5.6146 = cubic feet
0.15898 = cubic meters
34.9726 = Imperial gallons
42 = U.S. gallons
158.984 = liters
0.1588 = metric tons (water 60° F.)
. . . . = tons of crude oil (see crude oil conversion factors table)

Centare multiplied by:
1 = square meters

Centimeters, Linear multiplied by:
0.3937 = inches
0.0328 = feet
0.01094 = yards
0.01 = meters
10 = millimeters

Centimeters, Cubic multiplied by:
0.0610 = cubic inches
0.0353 = cubic feet
0.0000013 = cubic yards
0.000001 = cubic meters
0.001 = decimeters

Centimeters, Square multiplied by:
0.1549 = square inches
0.0001 = square meters
100 = square millimeters

Feet, Linear multiplied by:
12 = inches
0.3333 = yards
30.48 = centimeters
0.3048 = meters
0.0003 = kilometers
0.3600 = varas (Texas)

Feet, Cubic multiplied by:
1728 = cubic inches
0.03704 = cubic yards
28,317.016 = cubic centimeters
28.3170 = cubic decimeters

Feet, Cubic, continued
28.317 = liters
0.02832 = cubic meters
7.4805 = U.S. gallons
6.2288 = Imperial gallons
0.17811 = U.S. barrels

Feet, Square, multiplied by:
144 = square inches
0.1111 square yards
0.0929 = square meters
929.03 = square centimeters

Gallons, U.S. multiplied by:
128 = ounces
4 = quarts
8 = pints
0.8327 = Imperial gallons
0.0238 = U.S. barrels
231 = cubic inches
0.1337 = cubic feet
3785.332 = milliliters
3.78553 = liters
3785.43 = cubic centimeters
0.003785 = cubic meters

Gallons, Imperial multiplied by:
277.42 = cubic inches
0.16054 = cubic feet
4.54596 = liters
0.0045461 = cubic meters
1.2010 = U.S. gallons
0.028594 = U.S. barrels

Hectares multiplied by:
2.471 = acres
0.00386 = square miles
10,000 = square meters

Inches, Linear multiplied by:
0.0833 = feet
0.02777 = yards
0.0264 = meters
2.54 = centimeters
25.4 = millimeters

Inches, Cubic multiplied by:
0.000578 = cubic feet
0.000021 = cubic yards
16.3871 = cubic centimeters
0.016387 = cubic decimeters
0.0163865 = cubic liters
0.0000163 = cubic meters
0.0036 = Imperial gallons
0.00433 = U.S. gallons
0.5541 = ounces
0.0173 = quarts

Inches, Square multiplied by:
0.0069 = square feet
0.00078 = square yards
6.4516 = square centimeters
0.0006 = square meters

Kilograms multiplied by:
2.20462 = pounds
.0011023 = short tons

Kilograms Per Square Centimeter multiplied by:
14.233 = pounds per square inch

Kilograms Per Square Meter multiplied by:
0.2048 = pounds per square foot
0.001422 = pounds per square inch
0.0000968 = atmospheres

Kiloliters multiplied by:
35.31 = cubic feet
264.14 = U.S. gallons
1000 = liters

Kilometers multiplied by:
3280.83 = feet
1093.6 = yards
0.6214 = mile
1000 = meters
10,000 = centimeters

Kilometers, Square multiplied by:
247.1 = acres
0.3861 = square miles

Liters multiplied by:
33.8147 = fluid ounces
1.0567 = quarts
0.2642 = U.S. gallons
0.2200 = Imperial gallons
0.00629 = U.S. barrels (oil)
2.202 = pounds (water 60° F.)
61.0251 = cubic inches
0.0353 = cubic feet
1000.03 = cubic centimeters
0.0013 = cubic yards
0.001 = cubic meters

Mercury (Inches) multiplied by:
0.3342 = atmospheres (mean sea level)
0.4912 = pounds per square inch
345.3 = kilograms per square inch

Meters, Linear multiplied by:
39.3701 = inches
3.28084 = feet
1.09361 = yards
0.0006 = miles
100 = centimeters
0.001 = kilometers
1000 = millimeters

Meters, Cubic multiplied by:
61,023.38 = cubic inches
35.31445 = cubic feet
1.30796 = cubic yards

Meters, Cubic, continued:
1,000,000 = cubic centimeters
999.97 = liters
264.17 = U.S. gallons
219.97 = Imperial gallons
6.2898 = U.S. barrels (oil)

Meters, Square multiplied by:
1550 = square inches
10.764 = square feet
1.1959 = square yards
10,000 = square centimeters
0.0001 = hectares
0.0002471 = acres
1 = centare

Miles multiplied by:
5280 = feet
1760 = yards
1609.3472 = meters
1.6093 = kilometers
1900.8 = varas (Texas)
0.8684 = nautical miles

Miles, Square multiplied by:
3,097,600 = square yards
2,589,998 = square meters
258.9998 = hectares
2.5900 = square kilometers
640 = acres

Milliliters multiplied by:
0.0338 = fluid ounces
0.00026 = gallons
0.001 = liters
0.0610 = cubic inches

Millimeters multiplied by:
0.03937 = inches
0.001 = meters

Ounces, Fluid multiplied by:
0.0078 = gallons
1.8047 = cubic inches
0.0295 = liters
29.5729 = milliliters
28.35 = grams
16 = pounds

Poods multiplied by:
36.113 = pounds

Pounds multiplied by:
16 = ounces
0.0005 = short tons
0.4536 = kilograms
0.0277 = poods

Pounds Per Square Inch multiplied by:
0.06804 = atmospheres

Pounds Per Square Inch, continued
703.066 = kilograms per square meter
2.036 = inches of mercury

Tons, Long multiplied by:
2240 = pounds
1.01605 = metric tons
1.120 = short tons
1016 = kilograms

Tons, Metric multiplied by:
0.9842 = long tons
2204.6223 = pounds
1.1023 = short tons
1000 = kilograms
6.297 = U.S. barrels (water 60°F.)

Tons, Short multiplied by:
2000 = pounds
0.8929 = long tons
0.9072 = metric tons
907.2 = kilograms

Varas multiplied by:
2.7408 = feet (in Mexico)
2.7425 = feet (in Chile, Peru, Spain)
2.8408 = feet (in Argentina)
3.6083 = feet (in Portugal)
2.775 = feet (in Texas)
0.838 = meters (in Mexico)
0.8359 = meters (in Chile, Peru, Spain)
0.866 = meters (in Argentina)
0.8467 = meters (in Texas)
1.1 = meters (in Portugal)

Varas, Square multiplied by:
0.0001774 = acres

Yards, Linear multiplied by:
36 = inches
3 = feet
0.9144 = meters
91.4402 = centimeters
0.1200 = varas

Yards, Cubic multiplied by:
46.656 = cubic inches
27 = cubic feet
764,559.4 = cubic centimeters
764.6 = liters
0.76455 = cubic meters

Yards, Square multiplied by:
1296 = square inches
9 = square feet
8361.307 = square centimeters
0.8361 = square meters

ALASKA

THE search for oil in Alaska is still confined to Naval Petroleum Reserve No. 4, and while exploration continued during 1949 no commercial oil production was developed. The work being done is carried on by Arctic Contractors, Inc., under the direction of a Naval Operating Committee headed by Commodore William G. Greenman with the approval of the Secretary of the Navy.

Three tests were started in 1949, two of which were dry at 2900 and 7020 feet, respectively, and the third was drilling at 11,400 feet on March 1, 1950. Paleontology and stratigraphy of the general area were given further study in 12 core holes drilled from 900 to 1400 feet in depth in sections where terrain prohibits surface geologic interpretation.

All test wells and some core holes had shows of oil or gas, but the extent and physical characteristics of the reservoir rock were such that commercial production of oil was impossible.

One gas well was completed in 1948 and now furnishes fuel to the Navy's Point Barrow Camp. Another gas well is planned for 1950 in the same structure to serve as a standby gas source.

Plans for 1950 call for 6 geological and 5 seismograph parties plus 1 gravimeter crew to be in the field in the reserve during the summer months. Two navy helicopters will support one geological party which will range beyond present points accessible by land transportation, and the gravimeter party will be supported by two contract helicopters.

During 1950, at least four wells will be drilled to test known structures and there is a possibility of three additional wells being drilled in areas previously tested with single wells. Drilling equipment on hand in the reserve includes two heavy rigs for deep drilling, two medium units and one portable unit.

CANADA

CANADA'S province of Alberta increased its status during 1949 as one of the most important oil areas in the world. In the 12-month period, the estimated proven reserves of Alberta increased 100 percent to reach a total of more than 1 million barrels. Canada last year was again the third most active oil area in the world, being exceeded only by the U. S. and Venezuela.

The rapid growth and development of the country's oil reserves is apparent at a glance. Before discovery of the Leduc field in February, 1947, Canada's proven oil reserves totaled about 72 million barrels, and in three years the reserves increased more than 15 times over the pre-Leduc figure.

The province of Saskatchewan, immediately east of Alberta, dropped a little in yearly production as compared with 1948, but this was due to voluntary proration because of lack of adequate markets for the black crude. Had markets been available for the province's asphaltic crude, it is estimated that the production of 782,095 barrels in 1949 could have been doubled from existing wells. Despite this factor, Alberta recorded such an outstanding year in oil production that Canada almost doubled the previous year's total to reach a new high of 21,491,558 barrels during 1949.

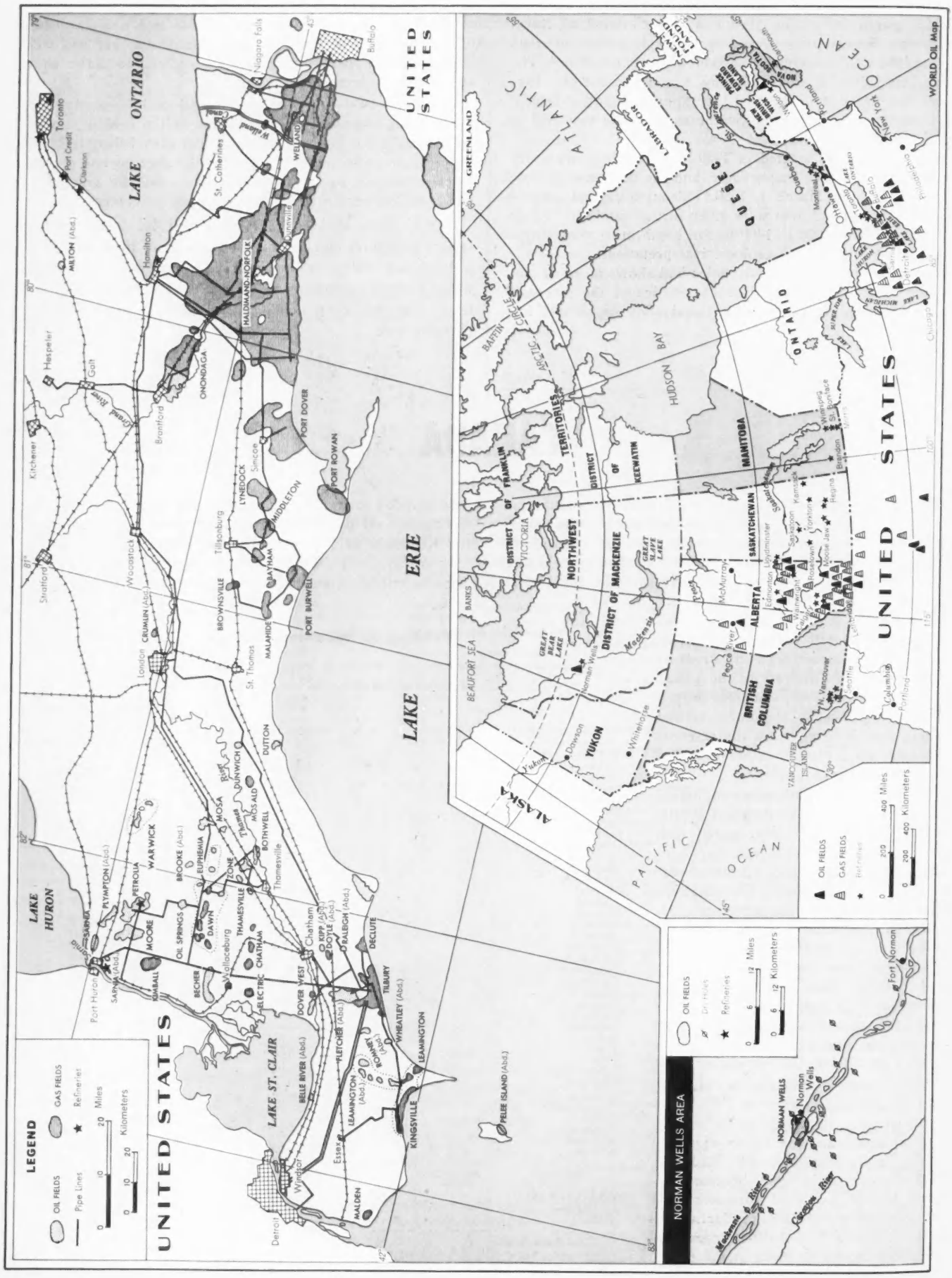
The province of Alberta not only doubled its proven reserves in 1949 but it also increased its potential oil production an equal amount by development drilling in its new fields. The Redwater field, discovered in 1948, became Canada's largest potential producer with the completion of 278 productive oil wells at the end of 1949 as compared with two producing wells at the end of the previous year. The Leduc-Woodbend field had 351 productive oil wells at the end of the year, but the thicker oil producing strata and discovered reserves of the Redwater field point to greater future production.

In reality, both the Redwater and Leduc-Woodbend fields are now operating under proration qutoas, for Alberta cannot

Drilling in Western Canada

PROVINCE and FIELD	WELLS COMPLETED IN 1948					WELLS COMPLETED IN 1949					Wells Drilling at End of 1949
				Total					Total		
	Oil	Gas	Dry	Wells	Footage	Oil	Gas	Dry	Wells	Footage	
ALBERTA:											
Armena	1	..	..	1	4,908	..	..	1	1	5,432	..
Athabaska	..	..	..	..	..	..	..	4	4	9,262	..
Bantry	..	..	2	2	7,203	..	..	1	1	3,259	..
Barrhead	..	..	..	..	..	..	..	1	1	6,414	1
Battleview	..	..	..	..	..	..	..	..	..	..	1
Bon Accord	..	..	..	..	..	1	..	2	3	12,162	..
Brooks	1	..	1	2	7,281	..	..	..	..	..	..
Campbell	..	..	..	..	..	1	..	1	2	8,785	..
Conrad	..	..	2	2	6,317	..	..	..	..	..	..
Craigmyle	..	..	..	..	..	..	..	3	3	15,028	..
Del Bonita	1	..	1	2	10,119	..	..	..	..	..	1
Elk Point	1	2	2	5	6,883	..	1	..	1	4,449	..
Excelsior	..	..	..	..	..	1	..	..	1	4,125	1
Foremost	..	..	3	3	8,231	..	..	..	..	..	..
Golden Spike	..	..	..	..	..	2	..	2	4	25,120	1
Hanna	1	1	1	3	11,720	1	1	2	4	18,347	..
Joseph Lake	..	..	..	..	..	3	..	1	4	15,078	..
Lac la Biche	..	..	..	..	..	..	1	2	3	8,428	..
Leduc-Woodbend	131	5	11	147	901,406	183	..	17	200	1,058,562	20
Lloydminster	50	..	23	73	149,221	18	..	2	20	39,147	..
Pincher Creek	..	..	..	..	..	..	..	..	..	..	1
Princess	1	2	3	6	20,001	..	..	1	1	3,303	..
Provost	..	..	1	1	2,472	..	..	..	..	..	..
Redwater	1	..	2	3	12,361	287	3	10	300	979,323	15
Stettler	..	..	2	2	12,829	2	..	6	8	44,101	3
Taber	5	..	4	9	29,042	..	..	..	..	..	..
Tilley	..	..	..	..	..	..	..	1	1	4,262	..
Turner Valley	2	4	1	7	69,914	6	..	..	6	51,493	2
Twin River	..	..	1	1	3,975	..	..	..	..	..	1
Vermilion	3	..	3	6	12,562	..	..	..	..	..	..
Viking-Kinsella	..	3	1	4	9,851	1	5	..	6	12,798	..
Volmer	..	..	..	..	..	1	..	..	1	3,681	..
Wainwright	..	..	1	1	2,232	..	..	..	..	..	..
Whitemud	..	..	..	..	..	4	..	5	9	38,501	2
Wildcats	4	3	67	74	361,061	..	11	118	129	635,233	27
Total Alberta	202	20	132	354	1,649,679	511	22	180	713	3,006,293	76
SASKATCHEWAN:											
Lloydminster	46	2	11	59	114,506	31	..	9	40	77,840	..
Wildcats	1	..	10	11	22,883	6	..	5	11	22,190	1
Total Saskatchewan	47	2	21	70	137,389	37	..	14	51	100,030	1
Total Western Canada	249	22	153	424	1,787,068	548	22	194	764	3,106,323	77

CANADA—Ontario and District of Mackenzie Fields



LOOKOUT FOR... *Canada*

HEILAND EXPLORATION COMPANY

SHREVEPORT, LOUISIANA • EDMONTON, ALBERTA, CANADA

THE NEW CENTER IN THE WORLD OF OIL

With eleven years continuous operation in the area, the Heiland Exploration Company's seismic surveys are assisting in the discovery of Canadian oil reserves.

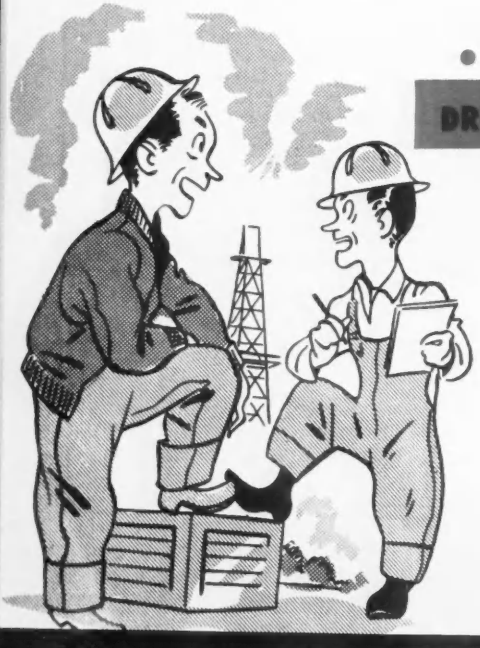
THE DOMINION OF CANADA

GENTLEMEN—*MAY WE QUOTE YOU?*

PETROLEUM ENGINEER

"WHEN LANE-WELLS PERFORATES, THEY DO IT RIGHT!"

"I learned, long ago, that I don't have to worry when Lane-Wells does a perforating job. They get to the rig on time, they get through on time, and they put the shots where I want 'em. Their measurements are on the nose. Sure, some jobs turn into headaches, but when they do, the Lane-Wells boys level with me, and we work it out together. I like their work, and I like the way they do business."

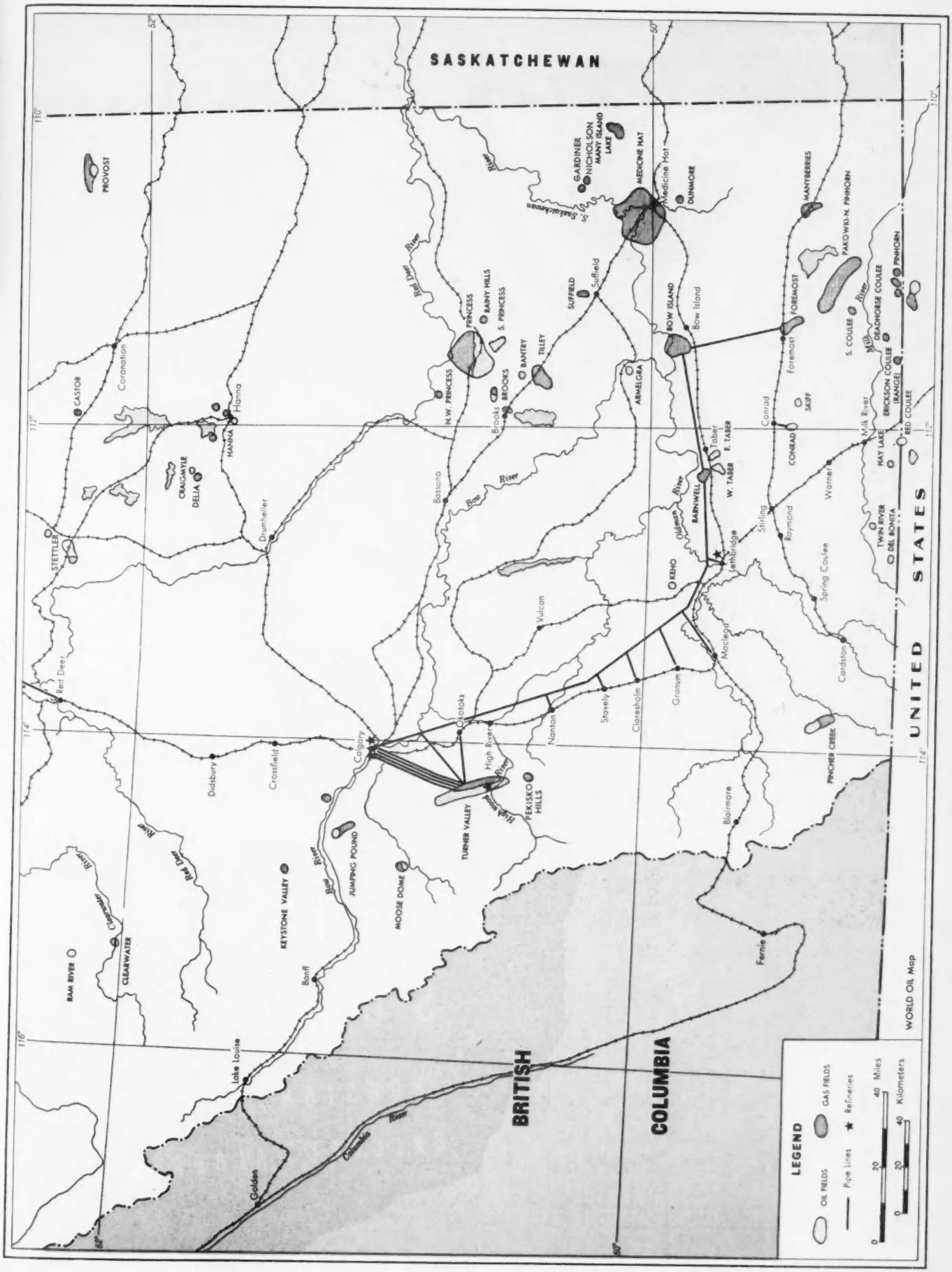


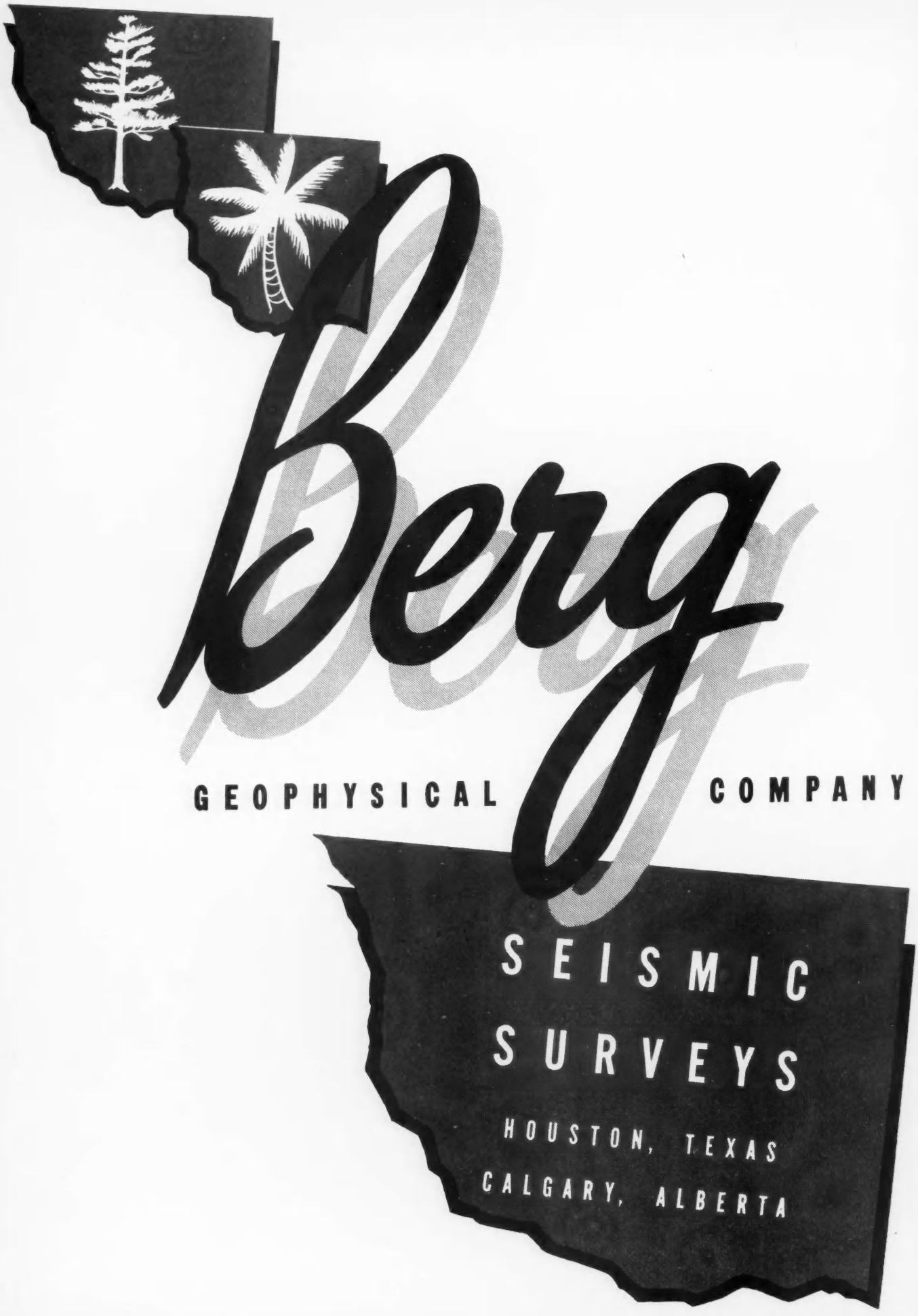
DRILLING SUPERINTENDENT

"THEIR KONESHOT IS TOPS WITH ME"

"For deep penetration on tough completions, we find Koneshot perforating just what the doctor ordered. Lane-Wells men didn't oversell it — they gave us facts and figures that showed just what it would do on multiple completions, heavy cement sheaths and the like. It really produces for us. And now, with semi-selective firing in that F-2 gun, Koneshot is tops with us."

CANADA—Southern Alberta Fields




Berg
GEOPHYSICAL COMPANY
SEISMIC SURVEYS
HOUSTON, TEXAS
CALGARY, ALBERTA

now market economically all the oil the province could produce. At the end of 1949 the Redwater quota was 70 barrels per well per day, and the Leduc-Woodbend quota was 55 barrels for the upper zone and 80 barrels for the lower zone.

A new high in Alberta exploratory drilling was reached in 1949 with 203 wells drilled. Sixteen of these discovered oil and four of the discoveries extended the Redwater and Leduc-Woodbend fields. At the end of the year 38 rigs were engaged in wildcat drilling throughout Alberta. In the prairie sections of Western Canada more than 110 million acres of oil and gas rights have been taken up for exploration by more than 100 companies and syndicates.

The Golden Spike field discovery by Imperial Oil Company, Ltd., 16 miles west of Edmonton, Alberta, provided the headlines for Canada in 1949. The two wells producing there during the year recorded a total of 85,081 barrels of oil from a limestone reef at a depth of about 6000 feet. The producing section was found to be 544 feet thick in the first well. This is the thickest oil-bearing zone ever encountered in Canada and development drilling is proceeding rapidly.

The second important field discovery during 1949 by Imperial was at Joseph Lake, 20 miles southeast of Edmonton, where four wells were completed and production was 35,858 barrels for the year from 3300 feet. These discoveries were followed by Imperial's Whitemud field, 15 miles southwest of Edmonton, which produced 26,506 barrels from four wells, and the Stettler field, discovered by Gulf Oil Company, 80 miles southeast of Leduc, which produced 15,725 barrels from two wells. Joseph Lake and Whitemud production comes from Cretaceous sandstone and Stettler production was found in Devonian dolomite and limestone reefs at about 5400 feet.

There were 110 geophysical parties operating in Western Canada in 1949. Of this number 72 were seismograph crews, 27 were gravity meter crews, and the remainder were magnetometer parties. One of the magnetometer parties was engaged in aerial surveying in Saskatchewan. The number of geophysical parties in the field in 1949 was double the number of such crews the previous year. The Normandville wildcat success in northwestern Alberta, completed in a limestone reef at 7400 feet, and the Excelsior wildcat, 12 miles north of Edmonton, were drilled on the basis of geophysical data. Both wells were completed late in 1949 by Imperial and will open two more important oil areas. Efforts of the industry to find new oil fields have so far covered only a small fraction of Western Canada's 655,000 square miles of prospective oil territory.

By the middle of 1949 more than 100 drilling rigs were operating in Alberta alone, and these, together with the rigs in Saskatchewan and Eastern Canada, accounted for the greatest number of completions and the greatest footage in Canada's history. During the year, there were 1102 wells completed for a total of 3,462,831 feet. Of the total wells, 566 were oil producers, 197 gas wells, and 339 dry holes.

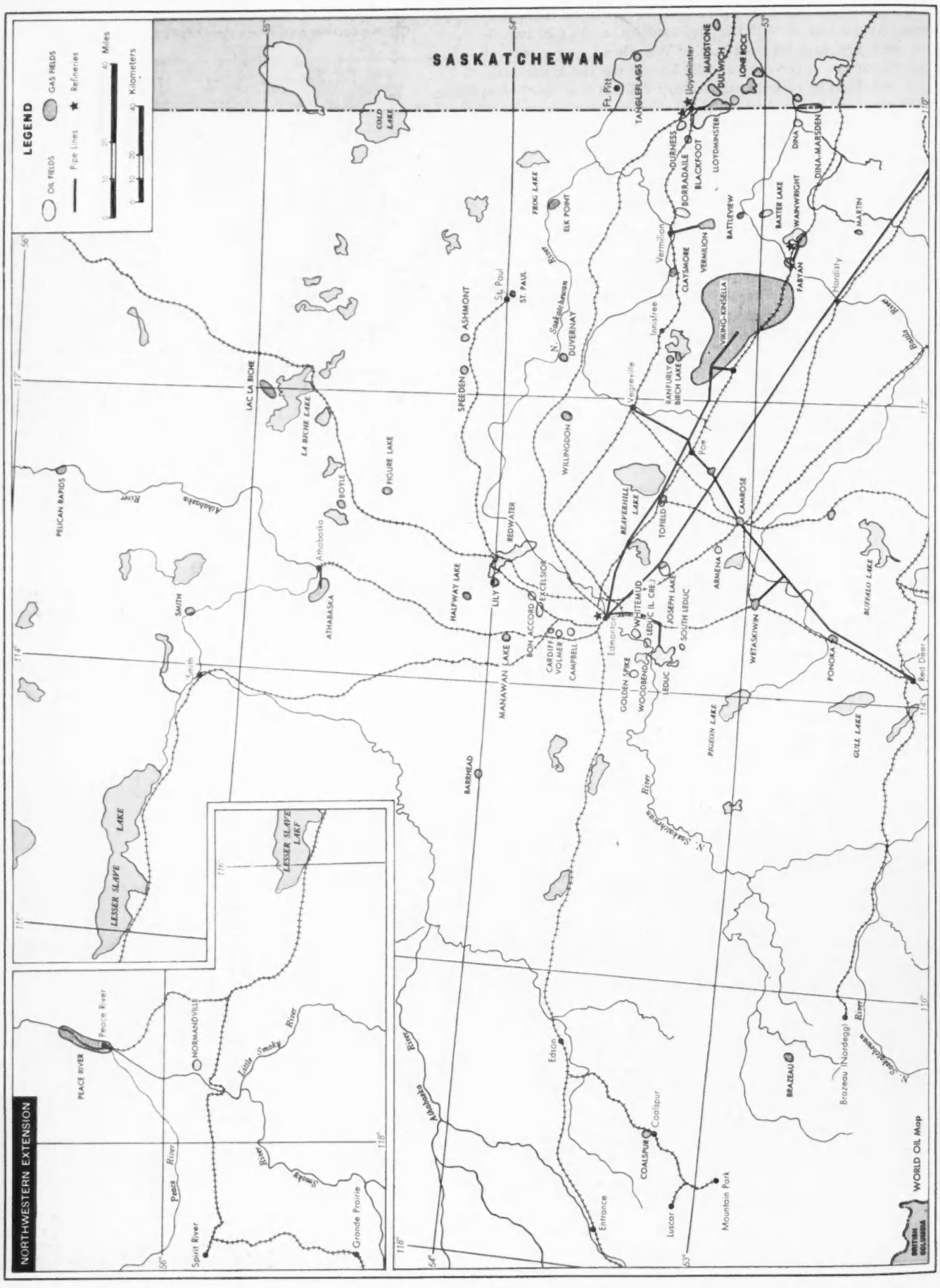
Oil Production and Producing Wells in Eastern Canada

Province, Township or Field	Year of Discovery	Producing Oil Wells End of 1949			CRUDE OIL PRODUCTION, (Barrels)			
		Flowing	Art. Lift	Total Producing	Daily at End of 1949	Year 1948	Year 1949	Cumulative Through 1949
NEW BRUNSWICK								
Stoney Creek	1909	..	27	27	..	21,372	19,544	454,205
ONTARIO								
Bothwell and Thamesville	1895	..	8	8	52.0	15,238	17,940	2,815,202
Brooke	.....	..	..	..	..	.....	.....	3,212
Chatham	.....	..	..	..	..	.....	.....	200
Dawn and Euphemia	1897 1932 1948	..	2	2	0.1	7,312	999	77,700
Dover and Raleigh	1917	..	8	8	10.4	3,830	3,762	215,938
Dunwich (Mesald)	1898	..	23	23	5.1	1,821	1,929	199,460
Moore (Kimball)	1904	..	5	5	0.5	544	301	435,277
Mosa	1904	..	168	168	48.5	18,341	18,580	549,065
Oil Springs	1859	..	641	641	70.0	25,165	25,592	8,132,040
Onondaga	1910	..	5	5	0.2	69	67	34,616
Petrolia and Enniskillen	1865	..	445	445	115.0	40,603	42,632	16,357,263
Plympton	.....	..	..	..	..	8	.....	170,008
Sarnia	1875	..	4	4	0.3	124	141	315,345
Sombra (Becher)	1946	28	.....	28	585.0	59,846	146,617	229,075
Tilbury, West	1947	..	..	..	..	609	.....	609
Warwick, Metcalfe & Adelaide	1938	..	10	10	4.9	2,479	2,010	120,880
Total	.....	28	1,480	1,508	892.0	197,361	280,214	30,110,095

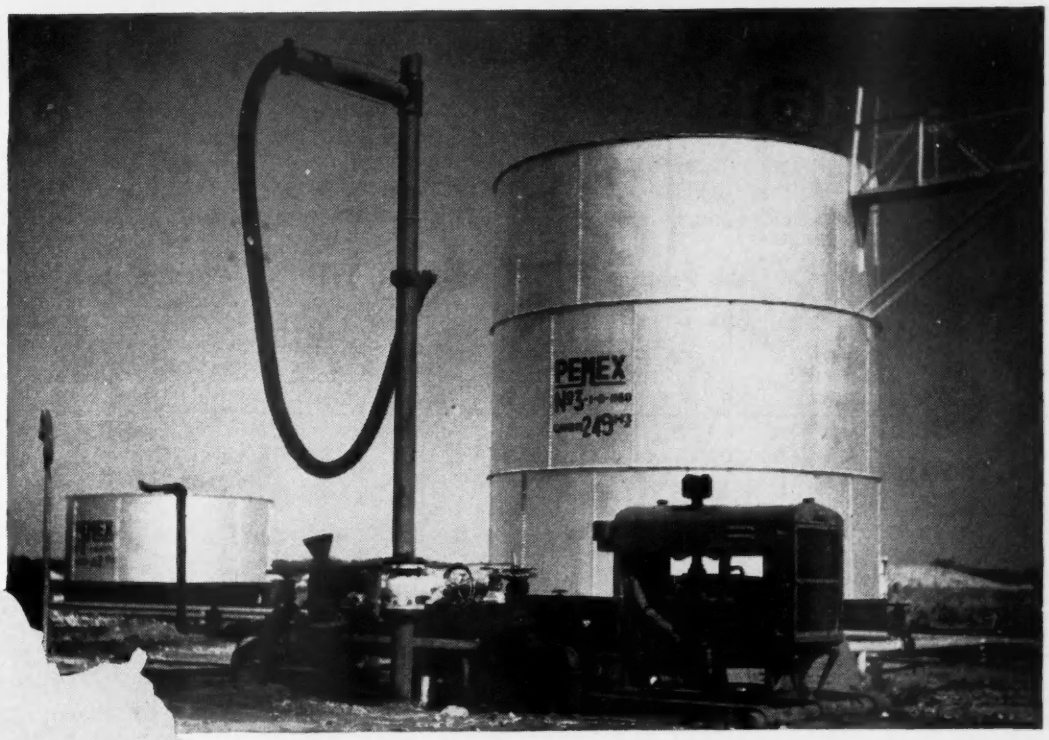
Drilling in Eastern Canada

PROVINCE COUNTY and TOWNSHIP	WELLS COMPLETED IN 1948					WELLS COMPLETED IN 1949				
	Oil	Gas	Dry	Total Wells	Total Footage	Oil	Gas	Dry	Total Wells	Total Footage
NEW BRUNSWICK:										
Stoney Creek	..	1	..	1	1,702	..	2	2	4	8,678
Wildcats	..	..	3	3	11,202	..	..	..	.....	.....
ONTARIO:										
Brant County:										
Tuscarora	..	2	..	2	1,409	..	..	..	.....	.....
Elgin County:										
Aldborough	..	7	4	11	17,022	3	4	..	7	7,058
Bayham	..	2	1	3	4,287	..	1	..	1	1,415
Dunwich	..	..	2	2	3,037	..	3	4	7	10,141
Malahide	..	..	..	.....	.....	..	..	2	2	1,981
Southwold	..	..	..	.....	.....	..	..	2	2	2,688
Yarmouth	..	..	..	.....	.....	..	..	1	1	1,226
Wildcats	..	7	4	11	17,022	..	..	..	.....	.....
Essex County:										
N. Colchester, Malden, Kingsville	2	4	3	9	10,222	..	..	..	.....	.....
Haldimand County:										
Haldimand	..	71	48	119	93,312	..	66	40	106	85,852
Kent County:										
Chatham Gore	..	1	5	6	10,623	1	..	..	1	1,945
Dover	..	1	4	5	15,250	..	..	..	.....	.....
Oxford	..	..	1	1	1,890	..	..	..	.....	.....
Raleigh	..	..	1	1	3,911	..	..	1	1	1,575
Romney	..	1	3	4	5,534	..	1	1	2	4,817
Zone	..	2	3	5	6,338	1	4	3	8	10,888
Wildcats	..	1	2	3	11,658	..	..	..	.....	.....
Lambton County:										
Bosanquet	..	..	1	1	485	..	..	..	.....	.....
Brooke	..	..	2	2	2,626	..	..	..	.....	.....
Dawn	..	..	2	2	3,496	..	1	..	1	1,795
Enniskillen	6	..	3	9	9,092	1	..	..	1	481
Euphemia	2	..	10	12	4,489	1	..	2	3	2,353
Moore	..	5	9	14	32,397	..	6	10	16	35,712
Plympton	..	..	1	1	525	..	..	2	2	1,202
Sarnia	..	..	1	1	1,890	..	..	3	3	1,597
Sombra	6	1	8	15	29,809	11	1	12	24	49,426
Warwick	..	..	3	3	3,108	..	..	4	4	1,822
Lincoln County:										
Caistor	..	8	1	9	4,323	..	4	2	6	2,986
Gainsboro	..	..	..	.....	.....	..	1	1	2	985
Norfolk County:										
Norfolk	..	25	17	42	50,165	..	16	21	37	42,417
Welland County:										
Welland	..	47	21	68	48,020	..	55	19	74	54,414
Middlesex County:										
Metcalfe	..	..	..	..	..	..	..	6	6	4,525
Mose	9	..	6	15	8,571	..	4	2	6	9645
Manitoulin Island	..	..	5	5	3,148	..	..	..	.....	.....
Other Areas	..	3	4	7	7,483	..	6	5	11	8,885
Total	25	189	178	392	424,046	18	175	145	338	356,508

CANADA—Central Alberta Fields



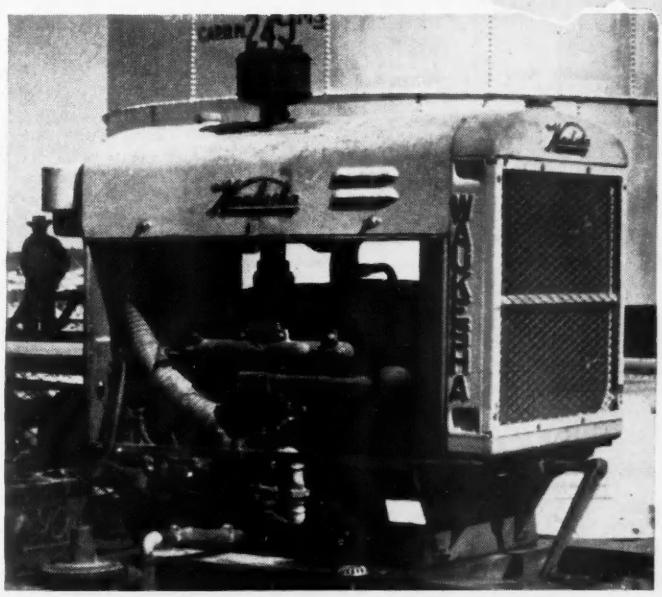
Photos by Mary St. Albans
Mexico City



SOUTH of the BORDER . . .

WAUKESHA powers the pumps

Waukesha 6-MZAU Oil Field GAS POWER UNIT—
60-80 hp.—6-cyl., 4¼-in. bore x 4¾-in. stroke, 404 cu. in. displacement.



● Handling crude oil from stock tanks to trucks for delivery to the refinery in the Reynosa field in the State of Tamaulipas, Mexico—the Worthington pump is direct-connected to a Model 6-MZAU Waukesha Power Unit burning natural gas. In any oil field . . . South of the Border . . . or North . . . look for Waukeshas at work. In this unit the thousands of oil field horsepower-hours back of its dependable design make it rugged and reliable in service. A power plant of 404 cu. in. displacement, with 4¼-in. bore and 4¾-in. stroke, the six-cylinder MZAU Waukesha Power Unit will deliver 58 hp. continuously under full load. Maximum output is 86 hp. at 2200 rpm. It's all real horsepower—sure, solid and smooth. In the engine's design, the combination of the Waukesha Manifold and Controlled Turbulence Combustion Chamber not only increases power and torque output, but betters fuel economy. Details in Bulletin 1408. And for the entire Waukesha Power line, send for Bulletin 1079.

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.
NEW YORK • TULSA • LOS ANGELES

WAUKESHA
Diesel Power . . . Gas Power . . . POWER

CANADA—Continued

Saskatchewan's drilling activities centered largely on wildcat drilling with long range stepouts in the Lloydminster area. Husky Oil and Refining Company, Ltd., completed five wells in scattered localities 10 to 20 miles east of Lloydminster, three of the wells finding production. Caldough Oil Company found production 30 miles east of Lloydminster with four wells producing from the Big Gully sand of the Lower Cretaceous, a zone above the Sparky sand from which practically all Lloydminster production comes. Thirty miles south of Lloydminster, in the Dina and Marsden areas, eight

Oil Production and Producing Wells in Western Canada

PROVINCE and FIELD	Year of Discovery	PRODUCTIVE WELLS END OF 1949			CRUDE OIL PRODUCTION—(Barrels)			
		Producing	Shut in	Total	Daily at End of 1949	Year 1948	Year 1949	Cumulative Through 1949
ALBERTA:								
Armelgra	1943	....	....	....	....	....	....	462
Armena	1948	....	1	1	....	1,184	....	1,184
Bantry (Brooks)	1947	1	1	2	37	2,037	13,979	30,528
Barrhead	1949	1	1	2	3	.....	4,223	4,223
Baxter Lake	1946	....	....	....	....	....	....	1,709
Bon Accord	1949	1	....	1	46	.....	9,676	9,676
Campbell	1949	1	....	1	21	....	4,685	4,685
Conrad	1944	16	1	17	335	179,627	139,728	903,358
Del Bonita—Twin River	1939	1	2	3	....	8,433	7,365	53,035
Dina	1929	2	1	3	148	4,200	14,062	59,773
Excelsior	1949	1	....	1	52	.....	1,616	1,616
Golden Spike	1949	2	....	2	325	....	85,081	85,081
Hanna	1948	....	1	1	.....	175	454	629
Hay Lake Dome	1946	....	....	....	....	....	....	1,140
Joseph Lake	1949	4	....	4	382	....	35,858	35,858
Jumping Pound	1944	....	....	....	....	741	.....	9,259
Keho Lake	....	....	....	....	....	....	....	955
Leduc—Woodbend	1947	341	10	351	25,454	4,657,371	9,688,784	14,718,582
Lloydminster	1940	75	61	136	1,995	648,055	716,941	1,785,565
Moose Dome	1937	....	....	....	....	....	....	8,977
Normandville	1949	1	....	1	119	....	5,891	5,891
Pincher Creek	1948	....	1	1	....	2,241	2,319	4,560
Princess	1940	12	8	20	328	125,828	121,227	587,605
Provost	1946	....	....	....	....	....	....	1,673
Ram River	1944	....	....	....	....	....	....	207
Red Coulee	....	....	....	....	....	....	....	329,851
Redwater	1948	223	55	278	12,387	36,875	4,793,491	4,830,366
Skiff	....	....	....	....	....	....	....	8,298
Stettler	1949	2	1	3	291	....	15,725	15,725
Taber	1937	19	2	21	519	201,527	150,746	1,191,644
Tilley	1942	....	....	....	....	....	....	14,513
Turner Valley:								
Oil	1914	292	35	327	10,100	4,432,084	3,826,543	94,919,830
Natural Gasoline	....	....	....	....	1,716	468,655	477,520	7,236,140
Turner Valley, Total	....	292	35	327	11,816	4,900,739	4,304,063	102,155,970
Vermilion	1939	24	29	53	169	112,331	86,933	1,177,719
Volmer	1948	1	....	1	4	41	1,027	1,068
Wainwright	1922	3	5	8	21	17,131	16,086	287,972
Whitemud	1949	3	1	4	157	.....	26,506	26,506
Alberta, Total	....	1,026	216	1,242	54,609	10,898,536	20,246,466	128,355,863
SASKATCHEWAN:								
Lloydminster	1942	95	n.a.	95	2,014	849,166	782,095	2,314,601
NORTHWEST TERRITORIES:								
Norman Wells	1920	n.a.	n.a.	n.a.	501	349,768	182,783	2,970,627
Western Canada, Total	....	1,121	216	1,337	57,124	12,097,470	21,211,344	133,641,091

Engineering and Geological Information on Eastern Canada Fields

PROVINCE and TOWNSHIP	Proved Area (Acres)	Gravity Oil (API)	PRODUCING FORMATION			DEPTH (Feet)		Type of Structure
			Name	Kind	Age	Minimum to Top of Pay (Ft.)	Maximum to Bottom of Pay (Ft.)	
NEW BRUNSWICK:								
Stoney Creek	1,695	37	Albert	Sand	Miss.	1500	3200	Anticline-Monocline
ONTARIO:								
Bothwell	400	36	Onondaga	Lime	Devonian	395	410	Anticline
Brant	....	Gas	Medina-Cataract	Lime-Sand	Silurian	360	532	Monocline
Dawn	600	40	Onodaga	Lime	Devonian	320	370	Dome
	600	36	Guelph-Salina	Lime	Silurian	1600	1800	Dome
Declute	600	Gas	Guelph-Salina	Lime	Silurain	....	....	Anticline
Dover West	900	36	Trenton	Lime	Ordivician	2950	3300	Fault
Dunwich	500	Gas	Onondaga	Lime	Devonian	3300	400	Dome
Elgin	....	Gas	Clinton	Lime	Silurian	1250	1400	Monocline
Essex	2,000	40	Guelph-Salina	Lime	Silurian	900	1100	Anticline
Haldimand-Norfolk	145,000	Gas	Medina-Cataract	Sand-Lime	Silurian	350	900	Monocline
	18,900	Gas	Clinton	Lime	Silurian	870	1200	Lens
Kent	15,000	Gas	Guelph-Salina	Lime	Silurian	1200	1400	Dome
Lincoln	5,400	Gas	Medina-Cataract	Sand-Lime	Silurian	315	500	Monocline
Middlesex	200	Gas	Grimsby	Lime	Silurian	1450	1500	Monocline
Moore	500	Gas	Salina	Lime	Silurian	2150	2200	.....
Mosa	4,000	Gas	Widder	Lime	Devonian	275	425	Dome
Oil Springs	750	38	Onondaga	Lime	Devonian	370	400	Dome
Onondaga	1,920	39	Medina-Cataract	Sand	Silurian	480	650	Monocline
Petrolia	8,000	36	Onondaga	Lime	Devonian	470	510	Abnticline
Sombra Township	1,000	Gas and Oil	Salina	Lime	Silurian	1825	1900	.....
Tilbury	3,000	Gas	Guelph-Salina	Lime	Silurian	1050	1400	Anticline
Thamesville	300	Gas	Onondaga	Lime	Devonian	370	380	Anticline
Welland	38,000	Gas	Medina	Lime	Silurian	400	910	Monocline
Wentworth	6,000	....	Clinton	Lime	Silurian	300	440	Monocline

CANADA—Continued

new oil wells were drilled in 1949. Early in the year, Lloyd Rock Oil Company drilled a wildcat five miles west of the town of Marsden and 2½ miles from nearest production in the Dina area. Fourteen oil wells were completed during the year in the new Dulwich field, six miles southeast of Lloydminster. The Lone Rock field proper had ten successful oil completions in 1949, making a total of 42 producers.

In Eastern Canada, production increased about 83,000 barrels in 1949. Southwestern Ontario is generally considered the cradle of Canada's petroleum industry because commercial development of oil took place there nearly 100 years ago. Imperial is doing much to keep this area alive in oil output. During 1949 the company drilled 45 wells in the area, of which 15 were successful, and the Sombra field, operated by Imperial, is Eastern Canada's biggest annual oil producer. Discovered in 1946, Sombra now has 28 oil wells which produced 146,617 barrels in 1949—almost three times the previous yearly output. In comparison with the discoveries in Western Canada, the new field developments in Ontario are small, but the province continues to add to Canada's oil supply each year. Gas production in Eastern Canada is especially important to the industrial welfare of the region, the annual output being a little more than 8 billion cubic feet.

Canada's refinery and products-processing industries have kept apace of the increasing oil production from the fields. A $5.5 million gas processing plant at Leduc, which started

Engineering and Geological Data on Western Canada Fields

PROVINCE and FIELD	Est. Proved Area (Acres)	Gravity of Oil (API)	Name	Kind	Age	DEPTH (Feet) Minimum to Top of Pay	DEPTH (Feet) Maximum to Bottom of Pay	Average Thickness of Pay (Feet)	Type of Structure
ALBERTA:									
Armelgra	.....	18	Ellis	Sand	Jurassic	3100	....	....	.....
Armena	.....	38	Devonian	Lime	Devonian	4152	4174	....	.....
Athabaska	25,000	Gas	Labiche	Sand	Cretaceous	600	1300	....	Strat. Trap
Bantry	.....	24	Bantry	Sand	Cretaceous	3253	3270	....	.....
Barnwell	5.000	Gas	Bow Island	Sand	Cretaceous	2150	....	10	Monocline
Barrhead	.....	24	Madison	Lime	Pennsylvania	4008	4016	....	.....
Battleview	.....	Gas	.....	Sand	Cretaceous	....	....	....	.....
Baxter Lake	.....	17	Wainwright	Sand	Cretaceous	....	....	....	.....
Bon Accord	.....	35	Devonian	Lime	Devonian	3585	3608	23	.....
Bow Island	10,000	Gas	Bow Island	Sand	Cretaceous	1900	2255	9	Dome
Brooks	.....	27	Sunburst	Sand	Cretaceous	3300	3350	....	.....
	2,500	Gas	Milk River	Sand	Cretaceous	1190	1250	100	Strat. Trap
Campbell	.....	35	.....	Sand	Cretaceous	3704	3720	16	.....
Conrad	1,000	26	Ellis	Sand	Jurassic	2960	3125	13	Strat. Trap
Craigmyle	.....	34	Madison	Lime	Mississippian	4024	4044	20	.....
Del Bonita	200	36–38	Madison	Lime	Mississippian	5054	....	12	Anticline
Dina	400	14–15	Meridian	Sand	Cretaceous	1680	1900	15	Strat. Trap
Excelsior	.....	35	.....	Lime	Devonian	3854	3870	16	.....
Fabyan	200	Gas	Viking	Sand	Cretaceous	1585	1900	10	Strat. Trap
Foremost	5,000	Gas	Bow Island	Sand	Cretaceous	2050	2250	9	Anticline
Golden Spike	.....	38	Devonian	Lime	Devonian	5362	5900	540	Coral Reef
Hanna	.....	33	Sunburst	Sand	Cretaceous	3700	3731	20	Strat. Trap
Hay Lake	100	30	Madison	Lime	Mississippian	3094	....	4	Dome
Joseph Lake	.....	37	Viking	Sand	Cretaceous	3264	3271	7	.....
Jumping Pound	.....	46	Madison	Lime	Mississippian	9900	....	300	Anticline
	.....	Dist.	Madison	Lime	Mississippian	....	....	....	.....
Keho Lake	.....	32	Bow Island	Sand	Cretaceous	3680	....	5	Anticline
Keystone Valley	.....	Gas	Blairmore	Sand	Cretaceous	8500	....	....	.....
Kinsella-Viking	250,000	Gas	Viking	Sand	Cretaceous	2100	2200	10	Strat. Trap
Lac la Biche	.....	Gas	Viking	Sand	Cretaceous	780	810	....	.....
	.....	Gas	Devonian	Lime	Devonian	1544	1585	....	.....
Leduc-Woodbend	15,000	39	Devonian	Lime	Devonian	5000	5425	60	Coral Reef
	500	39	Lower Cretaceous	Sand	Cretaceous	3590	4231	....	.....
Lloydminster-Lone Rock-Blackfoot	20,000	14–18	Sparky	Sand	Cretaceous	1750	2000	10	Strat. Trap
Medicine Hat	40,000	Gas	Medicine Hat	Sand	Cretaceous	900	1250	20	Strat. Trap
Moose Dome	200	47	Fairholme	Lime	Devonian	1534	....	....	Dome
Normandville	.....	39	Devonian	Lime	Devonian	....	....	15	.....
Pakowki-Pinhorn	25,000	Gas	Bow Island	Sand	Cretaceous	2000	2200	....	Strat. Trap
Pincher Creek	.....	57 (wet gas)	Madison	Lime	Mississippian	11700	12500	400	Anticline
Princess	200	34	Devonian	Lime	Devonian	3980	4000	18	Dome
	200	26–28	Sunburst	Sand	Cretaceous	3177	....	35	Strat. Trap
	200	26	Madison	Lime	Mississippian	3300	3320	5	Start. Trap
Provost	.....	21	.....	Sand	Cretaceous	2525	....	....	.....
	.....	Gas	Viking	Sand	Cretaceous	2300	....	....	.....
Ram River	.....	.....	.....	.....	Devonian	3000	....	8	.....
Red Coulee	150	31	Vanalta	Sand	Cretaceous	2417	2475	30	Terrace
Redwater	25,000	35	Devonian	Lime	Devonian	3105	3303	146 (max.)	Coral Reef
Saint Paul	.....	Gas	Lower Cretaceous	Sand	Cretaceous	1547	1570	10	.....
Simmons	.....	35	Devonian	Lime	Devonian	3087	3272	185	Coral Reef
Skiff	.....	.....	Ellis	Sand	Jurassic	3054	3080	....	.....
South Princess	500	26–28	Madison	Lime	Mississippian	3271	3326	20	Dome
Stettler	.....	32	Devonian	Lime	Devonian	5097	5240	50	.....
	.....	Gas	.....	Sand	Cretaceous	4200	4348	100	.....
	.....	Gas	Sunburst	Sand	Cretaceous	4340	4348	....	.....
Suffield	2,000	....	Medicine Hat	Sand	Cretaceous	980	1130	40	Strat. Trap
Taber	760	17–23	Taber	Sand	Cretaceous	3028	3260	23	Strat. Trap
Tilley	.....	27	Sunburst	Sand	Cretaceous	3170	....	10	Strat. Trap
Turner Valley	25,000	37–64	Madison	Lime	Mississippian	3400	9600	450	Anticline
Twin River	.....	36	Madison	Lime	Mississippian	3913	3964	....	Anticline
Vermilion	1,000	14	Vermilion	Sand	Cretaceous	1870	1980	5	Strat. Trap
Wainwright	12,000	22	Wainwright	Sand	Cretaceous	2200	2300	10	Anticline
Whitemud	.....	38	.....	Sand	Cretaceous	4061	4092	....	.....
SASKATCHEWAN:									
Lloydminster-Lone Rock			See Alberta Fields						
Maidstone	.....	.....	Sparky	Sand	Cretaceous	1850	....	....	.....
Kamsack	.....	Gas	.....	.....	Cretaceous	....	....	....	.....
Unity	.....	Gas	Sparky	Sand	Cretaceous	2100	....	15	.....

Century

THE EARTH TELLS ITS SECRETS

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Oil Operators hire Contract Seismograph Crews for only one reason: To help them find oil. To solve this difficult and expensive problem, the very best equipment and best trained personnel are required.

Century carries on a continuous program of research and development to assure the oil industry that Century will have available the most modern geophysical instruments. The technical staff on the field crews is composed of the best trained and best educated personnel available, but they are also given the benefit of constant research to devise better interpretational techniques.

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Contact Century for contract crews.

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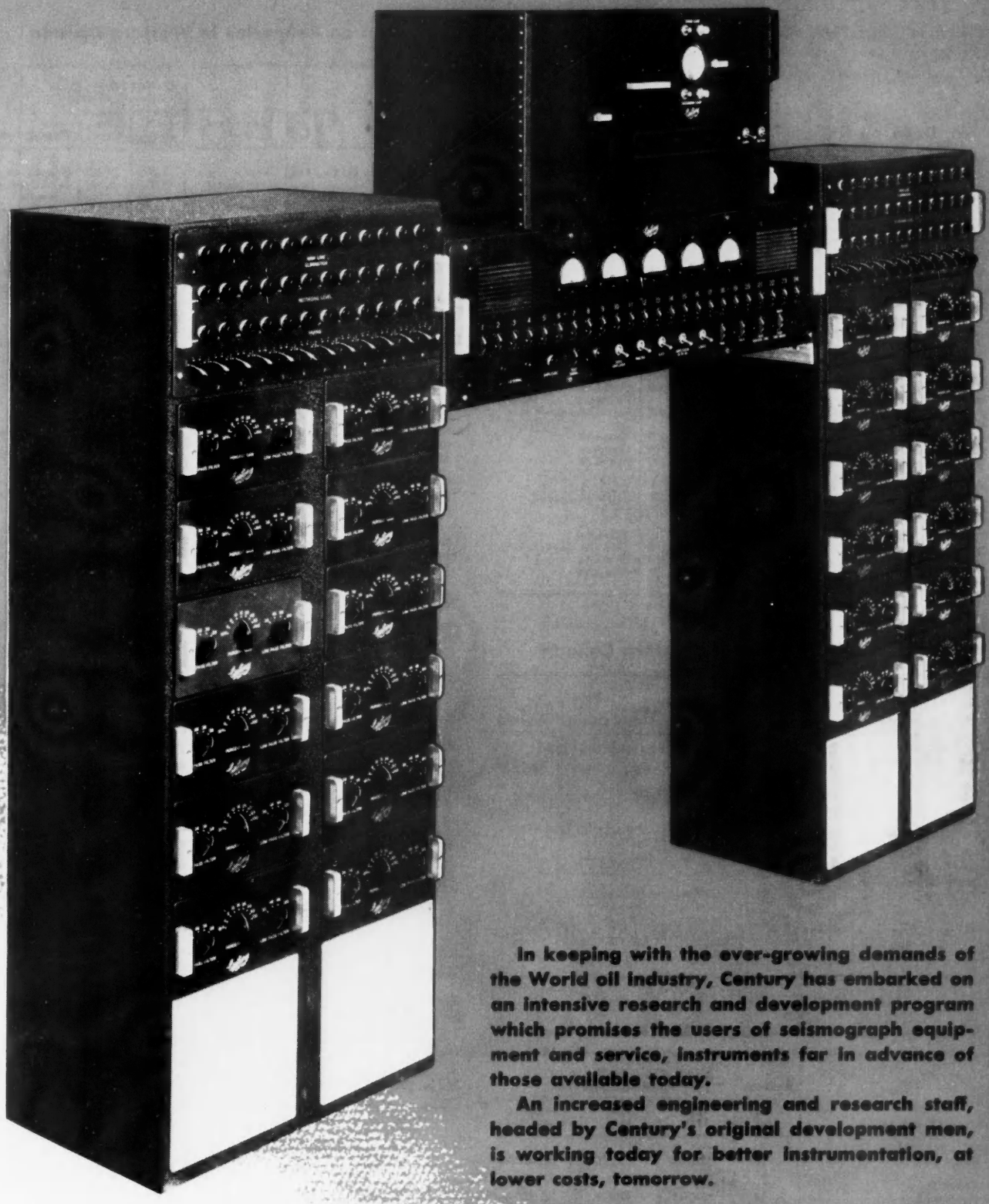

In keeping with the ever-growing demands of the World oil industry, Century has embarked on an intensive research and development program which promises the users of seismograph equipment and service, instruments far in advance of those available today.

An increased engineering and research staff, headed by Century's original development men, is working today for better instrumentation, at lower costs, tomorrow.

CORPORATION

TULSA, OKLAHOMA

EXPORT OFFICE: 149 Broadway, New York 6

CANADA—Continued

building in June, 1949, was formally opened in May.

Early this year ground was broken for Imperial's new 10,000-barrel refinery, about 8½ miles north of Winnipeg.

Data on Refineries in Eastern Canada

COMPANY	Location of Plant	Crude Charging Capacity (Bbls. Daily)	Cracking Capacity (Bbls. Daily)	Type of Refinery
NEW BRUNSWICK:				
New Brunswick Oilfields, Ltd.	Weldon	300	.....	Skimming
NOVA SCOTIA:				
Imperial Oil, Ltd	Imperial (2 miles of Dartmouth)	34,000	11,600	Skim-Crk-Asphalt
ONTARIO:				
British American Oil Co., Ltd.	Clarkson (Toronto)	8,250	4,500	Complete
	Toronto	6,000	3,000	Skim-Crk
Burlington Refineries, Ltd.	Hamilton	600	.....	Skimming
Canadian Oil Companies, Ltd.	Petrolia	3,500	1,500	Skim-Crk-Lube-Wax
Good Rich Refining Co., Ltd.	Port Credit (Toronto)	4,000	1,300	Skim-Crk
Imperial Oil, Ltd	Sarnia	41,500	20,000	Complete
McColl-Frontenac Oil Co., Ltd.	Toronto	13,000	3,300	Skim-Crk
QUEBEC:				
British American Oil Co., Ltd.	Montreal	17,000	7,500	Skim-Crk-Asphalt
General Petroleum Refineries.	Pointe-aux-Trembles (Montreal)	300	.....	Skimming
Imperial Oil, Ltd	Montreal	25,000	9,800	Skim-Crk-Asphalt-Lube
McColl-Frontenac Oil Co., Ltd.	Montreal	20,000	12,500	Skim-Crk
Shell Oil Co. of Canada, Ltd.	Montreal	10,000	7,500	Skim-Crk

Natural Gas Pipe Lines of Eastern Canada

COMPANY	Origin	Terminus	Length (Miles)	Diameter (Inches)	Year Completed
NEW BRUNSWICK:					
Moncton Electricity and Gas Co.	Stoney Creek	Moncton	8	10	1912
New Brunswick Oilfields, Ltd.	Stoney Creek	Weldon	2	3	....
ONTARIO:					
Dominion Natural Gas Co.	Tilbury	Hamilton	175	12, 10, 8	1912
	Tilbury	Kingsville	30	8	1912
	Haldimand	Hamilton	(2) 50	10	1910
Union Natural Gas Co., (Canada)	Haldimand	Hamilton	50	8	1936
	Dawn	London	60	10	1935
	Tilbury	Windsor	50	(2) 10	1906 1908
	Tilbury	Sarnia	55	10	1910
	Windsor	Detroit	7	16	1949

Gas Production and Producing Wells in Eastern Canada

PROVINCE and FIELD	Producing Wells End of 1949	NATURAL GAS PRODUCTION (Thousand Cubic Feet) Year 1948	Year 1949	Cumulative Through 1949
NEW BRUNSWICK:				
Stoney Creek	41	420,352	375,031	23,382,354
ONTARIO:				
Brownsville	15	25,816	66,849	3,717,334
Chatham and Camden	39	636,226	435,474	7,190,085
Dawn	30	350,998	112,863	18,130,192
Dover	14	134,780	100,431	11,351,648
D'Clute	38	528,384	355,370	17,089,859
Becher	7	550,597	283,955	969,294
Haldimand	2,284	1,772,101	2,056,381	86,256,623
Kimball-Payne	14	339,838	1,402,106	1,741,944
Kingsville	35	18,357	17,006	.....
Malahide	54	10,866	22,339	4,238,019
Mosald	18	.....	1,553	1,553
Onondaga	41	51,691	49,615	Formerly in Haldimand
Tilbury	256	1,682,281	1,896,370	208,737,117
Welland	509	471,488	455,461	44,398,304
Zone	48	1,488,010	681,940	5,059,131
Total	3,443	8,481,785	8,312,744	432,263,457

Data on Refineries in Western Canada

COMPANY	Location of Plant	Crude Charging Capacity (Bbls. Daily)	Cracking Capacity (Bbls. Daily)	Type of Refinery
ALBERTA:				
British-American Oil Co., Ltd.	Calgary	7,200	2,500	Skim-Crk-Asphalt
Excelsior Ref., Ltd.	Lloydminster	2,000	1,900	Skim-Crk-Asphalt
Gold Standard Oils, Ltd.	Wainwright	300	.....	Skimming
Imperial Oil, Ltd	Calgary	10,000	4,000	Skim-Crk-Asphalt
	Edmonton	16,200	9,000	Skim-Crk
Pacific O. & R. of Alberta	Lethbridge	2,000	.....	Skimming
Turner Valley G. & O. Ref., Ltd.	Hartwell (Turner Valley)	2,200	1,000	Skim-Crk
BRITISH COLUMBIA:				
Home Oil Distributors, Ltd.	N. Vancouver	2,000	.....	Skimming
Imperial Oil, Ltd	Ioco (Vancouver)	16,000	2,600	Complete
Shell Oil Co. of B.C.	Shellburn (Vancouver)	4,200	.....	Skimming
Standard Oil Co. of B.C.	Burnaby (Vancouver)	5,000	.....	Skim-Asphalt
DISTRICT OF MACKENZIE:				
Imperial Oil, Ltd	Norman Wells	1,000	.....	Skimming
MANITOBA:				
Anglo-Canadian Oils, Ltd.	Brandon	2,000	1,000	Skim-Crk
North Star Oil, Ltd	St. Bonaface	5,000	1,600	Skim-Crk-Asphalt
Radio Oil Refining, Ltd.	Winnipeg	500	.....	Skimming
Trump Oil Co., Ltd	Morris	250	.....	Skimming
SASKATCHEWAN:				
British-American Oil Co., Ltd.	Moose Jaw	6,000	2,000	Skim-Crk-Asphalt
HiWay Refineries, Ltd.	Moose Jaw	300	.....	Skimming
	Rosetown	275	.....	Skimming
	Saskatoon	2,800	600	Skim-Crk-Asphalt
Husky Refining Co.	Lloydminster	5,000	.....	Skim-Asphalt
Imperial Oil, Ltd	Regina	20,000	12,000	Skim-Crk-Asphalt
Northern Petroleum Corp.	Kamsack	600	.....	Skimming
Saskatchewan Federated Co-operatives, Ltd	Regina	2,000	900	Skim-Crk
Sterling Refineries, Ltd.	Yorktown	750	.....	Skimming

Natural Gas Pipe Lines of Western Canada

COMPANY	Origin	Terminus	Length (Miles)	Diameter (Inches)	Year Completed
Canadian Western Natural Gas, Light, Heat & Power Company	Turner Valley	Calgary	28	10	1922
	Turner Valley	De Winton	16	14	1922
	Turner Valley	Okotoks	15	6	1922
	Foremost	Bow Island	29.5	10	1912
	Bow Island	Calgary	169.5	16	1912
(Branches on Bow Island, Calgary system, served from Turner Valley)	.....	Lethbridge	4.1	8	1912
	.....	MacLeod	16.6	6	1915
	.....	Granum	5.5	6	1915
	.....	Claresholm	9.9	6	1920
	.....	Stavely	3.3	3	1915
	.....	Nanton	1.4	4	1915
Northwestern Utilities, Ltd.	Viking	Edmonton	77.2	12 (Double)	1923
Northwestern Utilities, Ltd.	Kinsella	Viking	10	10 & 12	1940
Northwestern Utilities, Ltd., (Branch on Viking-Edmonton system)	.....	Vegreville	20	4	1930
	.....	Ponoka	70	8	1946
	Ponoka	Red Deer	30	6	1946
Franco Utilities, Ltd	Vermilion field	Vermilion	5	4	1943
Wainwright Gas Company	Fabyan	Wainwright	7.5	4	1927

Crude Oil Pipe Lines of Western Canada

COMPANY	Origin	Terminus	Length (Miles)	Diameter (Inches)	Year Completed
Imperial Oil, Ltd	Leduc field	Nisku	8	8	1947
	Nisku	Edmonton	20	8	1948
Interprovincial Pipe Line Co., Ltd.	Edmonton	Superior, Wis.	1150	16, 18, 20	Building
Valley Pipeline Company	Turner Valley	Calgary	30	4	1925
	Turner Valley	Calgary	30	4	1937
	Turner Valley	Calgary	31	6	1938
	Turner Valley	(Gathering Lines)	105	2, 3, 4	1945
Standard Development Co.	Conrad field	Conrad	5½	4	1945
	Princess field	Princess	3½	3	1945

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MEXICO

MEXICO's production increased during the year to 166,401 barrels a day but the petroleum industry is still far short of the expansion goals set for all major industries in the country.

Total production for the year was 60,736,369 barrels, of which 13,581,388 barrels or 37,209 daily were exported. The remaining 47,154,981 barrels for domestic consumption were somewhat less than the estimated demand for 1949 of 55 million barrels set out by Petroleos Mexicanos, the government oil agency. Mexico's exports are her principal source of dollar exchange and the country would be reluctant to reduce this revenue.

Mexico is not now meeting its minimum requirements with domestic crude production and has not been able to cut down imports of special products from the U. S. which in 1949 were 5,577,546 barrels or 15,281 daily.

Development of new production is essential to the country's economy and as a step in this direction drilling activity was accelerated. During the year 158 wells were drilled as compared with 80 in 1948 and 51 in 1947. A minor oil boom occurred in the Reynosa field in the Northeastern district with 21 wells completed. Of these, six were oil productive and together with one well drilled in the Cano area boosted the yearly total for the district from 85,401 barrels in 1948 to 622,843 last year, or an average daily increase of 1472 barrels. The limits of the Reynosa field have not yet been established but the field is expected to live up to earlier predictions of a major new source of petroleum for the nation.

The Reynosa field also had nine successful gas wells, each with initial tests in excess of 3 million cubic feet per day. Near Matamoros a new gas field was found and is designated as the Brazil field, while there was no further expansion during the year in the Mision and Camargo gas areas, also in the Northeastern district.

A new oil find was the Cano 1 near Reynosa, with successful wildcats near Belem in Tabasco State and an offshore strike in Southern Veracruz in November, 1949. This latter well was drilled by Mexican American Independent Oil Company, a group of U. S. oil men, known as CIMA, drilling for the Mexican government. This group is doing further exploration work near its first well and in the State of Campeche near Carmen.

Successful oil completions in the old Cacalilao field in the Northern district were recorded as seven out of 15 wells

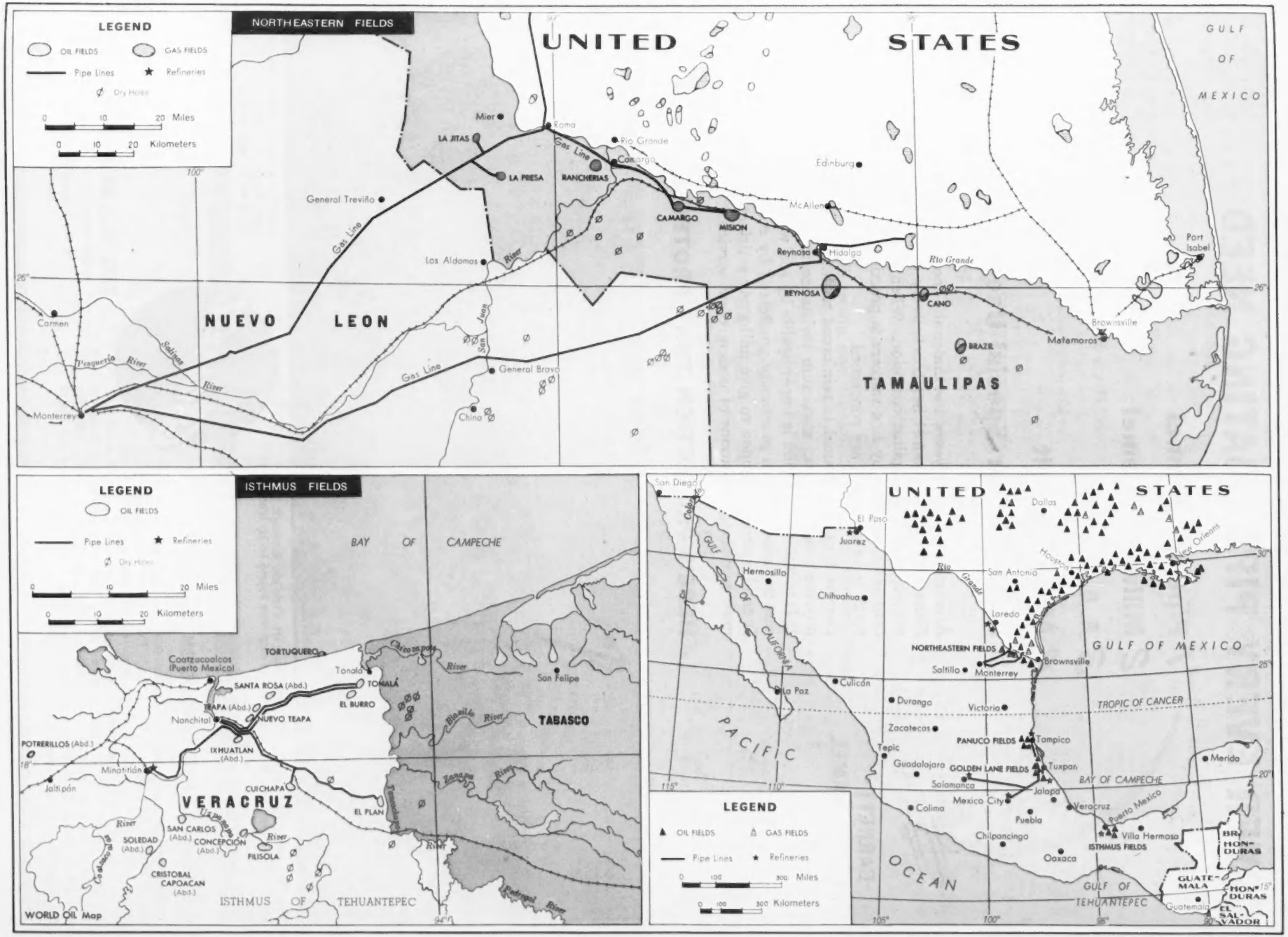
Oil Production and Producing Wells in Mexico

DISTRICT	COMPANY	Year of Discovery	OIL WELLS AT END OF 1949			CRUDE OIL PRODUCTION (Barrels)			
			Shut In	Producing	Total	Daily At End 1949	Year 1948	Year 1949	Cumulative Through 1949
Isthmus	Petróleos Mexicanos (Pemex)	1921	40	276	316	18,763	6,056,371	6,432,814	159,847,144
Northeastern	Petróleos Mexicanos	1948	8	14	22	1,897	85,401	622,843	708,244
Northern	Petróleos Mexicanos, Mexican Gulf Oil, Others	1901	143	560	703	24,347	10,205,230	9,153,947	810,495,082
Poza Rica	Petróleos Mexicanos	1930	23	72	95	111,906	34,307,792	36,839,219	364,667,396
Southern	Petróleos Mexicanos, Mexican Gulf Oil, Others	1908	68	205	273	23,020	7,715,392	7,687,546	1,096,790,686
Total		....	282	1,127	1,409	179,933	58,370,186	60,736,369	2,432,508,552

Drilling in Mexico

FIELDS and STATE	WELLS COMPLETED IN 1948					WELLS COMPLETED IN 1949					Wells Drilling End of 1949
	Oil	Gas	Dry	TOTAL Wells	TOTAL Footage	Oil	Gas	Dry	TOTAL Wells	TOTAL Footage	
NORTHEASTERN DISTRICT:											
Brazil, Tamaulipas	..	..	..	..	.....	..	4	1	5	38,019	1
Camargo, Tamaulipas	..	..	3	3	9,453	..	..	..	..	.....	..
Cano, Tamaulipas	..	..	..	..	.....	1	..	1	2	12,943	1
Misión, Tamaulipas	..	..	1	1	2,821	..	..	..	..	.....	..
Reynosa, Tamaulipas	4	1	..	5	29,526	6	9	6	21	118,675	1
Wildcats, Chihuahua	..	..	1	1	8,514	..	..	1	1	10,496	..
Wildcats, Tamaulipas	..	1	1	2	17,813	..	..	2	2	19,650	1
NORTHERN DISTRICT:											
Cacalilao, Vera Cruz	3	..	..	3	5,748	7	..	8	15	27,285	2
Chapacao, Vera Cruz	2	..	1	3	5,840	1	1	2	4	7,442	..
Corcovado, Vera Cruz	..	..	..	..	.....	..	..	2	2	4,776	..
Limon, San Louis Potosí	1	..	4	5	14,487	4	..	..	4	8,338	1
Pánuco, Vera Cruz	..	..	..	..	.....	..	..	1	1	3,232	..
Wildcats, Tamaulipas	..	..	..	..	.....	..	..	3	3	17,577	2
SOUTHERN DISTRICT:											
Agua Nacida, Vera Cruz	..	..	..	..	.....	..	..	2	2	14,490	..
Alazan, Vera Cruz	..	..	..	..	.....	12	..	7	19	46,263	4
Chiconcillo, Vera Cruz	1	..	..	1	2,231	..	..	..	..	.....	..
Chinampa, Vera Cruz	..	..	3	3	6,750	1	..	2	3	7,613	..
Mig. Aleman, Vera Cruz	..	..	..	..	.....	..	..	1	1	11,060	..
Moralillo, Vera Cruz	5	..	3	8	43,378	12	..	5	17	87,658	1
Poza Rica, Vera Cruz	8	..	3	11	85,671	7	..	..	7	57,234	5
San Diego, Vera Cruz	..	..	..	..	.....	..	..	3	3	5,911	..
San Miguel-Mecatepec, Vera Cruz	3	..	1	4	20,238	..	..	..	..	.....	..
Tenexco, Vera Cruz	..	..	..	..	.....	..	..	1	1	7,456	..
Wildcats, Puebla	..	..	1	1	4,140	..	..	1	1	4,322	..
Wildcats, Vera Cruz	..	..	7	7	53,821	..	..	..	..	.....	..
ISTHMUS DISTRICT:											
Acalapa, Vera Cruz	1	..	..	1	4,905	1	..	3	4	9,930	1
Cuichapa, Vera Cruz	..	..	..	..	.....	1	..	..	1	2,307	..
El Burro, Vera Cruz	..	..	3	3	12,182	..	..	..	..	.....	..
El Plan, Vera Cruz	9	..	2	11	59,747	15	..	3	18	69,967	4
Moloacan, Vera Cruz	..	..	..	..	.....	13	..	2	15	25,918	..
Sarlat, Tabasco	..	..	..	..	.....	..	..	..	..	.....	..
Tonalá, Vera Cruz	..	..	1	1	3,291	..	..	..	..	.....	..
Wildcats, Tabasco	..	1	2	3	17,808	1	..	2	3	26,229	1
Wildcats, Vera Cruz	3	..	..	3	12,541	..	..	3	3	13,174	1
Total	40	3	37	80	420,905	82	14	62	158	657,965	26

MEXICO—Northeastern and Isthmus Fields



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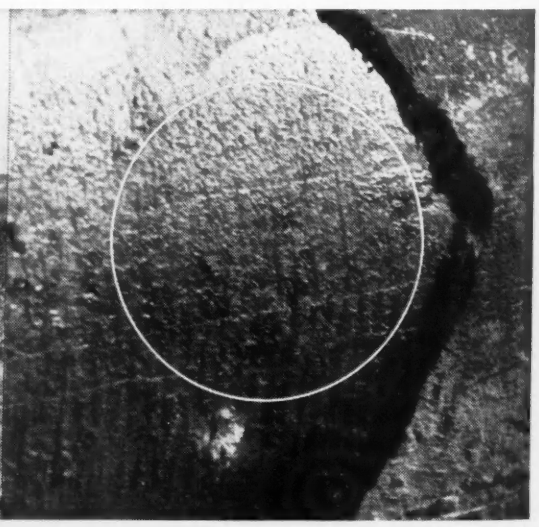

Note how clearly visible the original mill knurl marks are in this unretouched enlargement.

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drilled. These, together with four completions in the Limon field and one in the Chapacao field, did not make up for normal depletion of existing wells in the district, as 21 wells were shut in during the year and daily production at the end of the year had dropped 3118 barrels. The Moloacan field continued to expand with 13 completions at shallow depths and seven new wells in the Poza Rica field boosted its daily total production. Additional small production was obtained in the El Plan field with 15 shallow completions. Other development has been in extensions of older fields which did not quite keep abreast of the number of wells shut in.

Mexico anticipates significant expansion of her petroleum production during 1950 with the combined efforts Petroleos Mexicanos and American operators in their exploratory operations.

Gas Production in Northeastern Mexico by Fields

DISTRICT and FIELDS	Operating Company	Producing Wells End of 1949	Gas Production (Millions of Cu. Ft.) Daily at End of 1949	Year 1948	Year 1949	Cumulative Through 1949
Rancherias	Ohio Mex.	5	.2	992.0	251.2	15,634.9
La Presa	Ohio Mex.	2	.4	204.3	183.7	2,045.6
Mier and Lajitas	Muñoz y Martinez	6	2.3	1,145.3	844.6	19,333.8
Misión	Pemex	3	6.9	2,486.3	3,196.6	7,944.8
Reynosa	Pemex	9	1.8	24.6	906.7	931.3
Camargo	Pemex	3	1.6	99.3	725.6	824.9
Brazil	Pemex	1	.3	.....	42.9	42.9
Cano	Pemex	1	.1	.....	9.8	9.8
Total	.....	30	13.6	4,951.8	6,161.1	46,768.0

Data on Mexico Refineries

DISTRICT and COMPANY	Location of Plant	Crude Charging Capacity (Barrels Daily)	Cracking Capacity (Barrels Daily)	Type of Refinery	Operating Status
Northern Mexico:					
Pemex	Nuevo Laredo	330	None	Skim.	Operating
	Nuevo Laredo	190	None	Skim.	Operating
	Cuidad Juarez	1,000	None	Skim.	Operating
Tampico:					
Pemex	Cuidad Madero	55,000	8,500	Complete	Operating
	Arbol Grande	20,500	None	S-L-[illegible]-A	Operating
	Mata Redonda	11,500	5,500	Skim.-Crk.	Operating
Poza Rica:					
Pemex	Poza Rica	6,400	None	Skim	Operating
Central Mexico:					
Pemex	Atzcapotzalco (Mexico City)	50,000	None	Complete	Operating
	Salamanca	30,000	None	Skim.	Planned
Isthmus:					
Pemex	Minatitlan	27,500	2,500	Complete	Operating
Total Operating	11 Plants	172,580	16,500	.....	.....

Engineering and Geological Data on Mexico Fields

FIELD and STATE	Est. Proved Area (Acres)	Gravity of Oil (API)	PRODUCING FORMATION Name	Kind	Age	Depth of Wells (Ft.) Minimum Top Pay	Maximum Total Depth	Average Thickness Pay (Ft.)	Type Structure
NORTHEASTERN MEXICO:									
La Presa, **Tamaulipas**	.....	Gas	Mt. Selman	Sand	Eocene	1925	3160	38	Anticline
Mier, **Tamaulipas**	.....	Gas	Mt. Selman	Sand	Eocene	2120	2345	....	Nose
Misión, **Tamaulipas**	.....	Dist.	Vicksburg	Sand	Lwr. Olig.	....	6040	....	Anticline
Rancherias, **Tamaulipas**	1,230	Gas	Fayette / Yegua / Cook Mt.	Sand	Eocene	264	2440	310	Anticline
Reynosa, **Tamaulipas**	.....	Dist.	Vicksburg	Sand	Lwr. Olig.	4625	8114	....	Anticline
TAMPICO AREA:									
Poza Rica, **Vera Cruz**	15,850	30	Tamabra	Lime	Lwr. Cre.	7250	7546	296	Nose
Northern District, **Ver.-Tampa,** (Ebano, Pánuco, etc.)	100,000	12	Tamaulipas	Lime fractures	Lwr. Cre.	1148	1968	*	Faulted Ant.
Southern District, **Vera Cruz** (Golden Lane)	33,000	20	El Abra	Lime reef	Lwr. Cre.	2200	2202	†	Faulted Ant.
Soledad, **Vera Cruz**	.....	40	Tamabra	Lime	Lwr. Cre.	6435	6480	10	Nose
ISTHMUS OF TEHUANTEPEC:									
Cuichapa, **Vera Cruz**	300	30	Concepción Inferior	Sand	Miocene	2100	2133	33	Faulted dome
El Burro, **Vera Cruz**	370	26	Concep. Inf.; Encanto	Sands	Miocene	2460	2620	62	Salt dome
El Plan, Lignitic Zone, **Vera Cruz**	830	24	Cedral, Lignitic	Sands	Miocene	1970	2440	216	Faulted Ant.
El Plan, Concepción, **Vera Cruz**	250	30	Concep. Inf.; Sup.	Sands	Miocene	5734	5865	131	Dome
El Plan, East Extension, **Vera Cruz**	80	35	Concep. Inf.; Encanto	Sands	Miocene	3883	4110	32	Faulted nose
Filisola, **Vera Cruz**	460	22	Encanto	Sand	Miocene	1585	1980	92	Fltd. terrace
Nuevo Teapa, **Vera Cruz**	40	36	Encanto	Sand	Miocene	429	711	29	Salt dome
Tonalá, **Vera Cruz**	470	28	Concep. Inf.: Encanto	Sands	Miocene	1640	2130	167	Salt dome
			Deposito	Sand	Oligocene				

* Production from fractures in first 800 feet of Tamaulipas and San Felipe lines. † Wells go into reef-phase limestone only about 2 feet.

Pipe Lines of Mexico

COMPANY	Origin	Terminus	Length (Miles)	Number of Lines and Pipe Sizes	Daily Capacity	Status
CRUDE LINES						
Petróleos Mexicanos	Ebano-Pánuco Fields	Tampico	35	Combination 8" & 10"	30,000 bbls.	In use
	Ebano-Pánuco Fields	Gathering Lines	144	4", 6" & 10"		
	Poza Rica Field	Mexico City	147	One 10"	50,000 bbls.	In use
	Poza Rica Field	Salamanca	287	12"	30,000 bbls.	Building
	Poza Rica Field	Tuxpan	39	One 6", one 8" & one 12"	125,000 bbls.	In use
	Tuxpan	Potrero	33	Two 8"	50,000 bbls.	In use
	Cobos (Tuxpan)	Alamo Field	20	One 8"	25,000 bbls.	In use
	Alamo Field	Tampico	103	Combination 8" & 10"	24,000 bbls.	In use
	Poza Rica Field	Alamo Field	35	One 12"	63,000 bbls.	In use
	Alamo Field	Potrero	14	One 8" & one 10"	75,000 bbls.	In use
	Potrero	Chijol (Tampico)	87	Three 8"	72,000 bbls	In use
	Tonalá Field	Minatitlan Refy.	35	Combination 8", 10" & 12"		
	El Plan Field	El Chapo Station	21	Combination 8", 10" & 12"		
	El Chapo Station	Nachital	6	One 10"	30,000 bbls.	In use
	Cuichapa	El Plan-El Chapo	3	One 8"		
PRODUCTS LINES						
Petróleos Mexicanos	Minatitlan	Salina Cruz	155	8"	.....	Planned
	Tonalá Field	Nanchital	23	3"	.....	In use
NATURAL GAS LINES						
Compañía Mexicana de Gas de Monterrey	Roma	Monterrey	96	12"	50 mil. cu. ft.	In use
	Misión Field	Roma	37	12"	30 mil. cu. ft.	In use
Gas Industrial de Monterrey, S. A.	Reynosa Field	Monterrey	135	14"	50 mil. cu. ft.	In use
Petróleos Mexicanos	Poza Rica Field	Mexico City	150	20"	30 mil. cu. ft.	In use

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UNITED STATES

SO WELL did the U. S. petroleum industry expand facilities and operations to meet peak demands for products during the postwar period that the return to a more normal level in 1949 was not unexpected. For three years following war's end, the oil industry waged an all-out battle to equip itself and to supply the nation's unprecedented oil needs. During 1949 the transition from a period of shortages to one of over-supply was made.

In 1949, a number of the industry's operations were cut back from the 1948 record levels. Crude production and refining rates were lowered, fewer wells were drilled, and less pipe line mileage was constructed, but these cutbacks were in comparison with a year that saw the industry's postwar efforts surge to a peak. Had the expansion that was necessary following hostilities been spread normally throughout the emergency years, 1949 operations would probably not have been recorded as a decline.

However, there were still some phases in which operations exceeded those of peak 1948. Natural gasoline and natural gas production rates were increased. Exploratory drilling and total footage drilled in all types of wells reached new highs. Proved crude reserves and the number of producing oil wells were boosted satisfactorily.

One of the most significant drops in the year's activity was domestic crude production. Principal cause of this decrease was competition from imported foreign oil, and very little resulted from drop in the nation's needs. This is supported by the fact that demand for oils in 1949 averaging 6,119,000 barrels a day was only .7 of 1 percent less than the 6,143,000 barrels needed daily in 1948.

Another factor in the production decline was the crude stocks situation. In 1949, those stocks were reduced slightly, while in 1948, producers put 25 million barrels of excess production into tanks.

Crude production averaged 5,042,000 barrels daily during the year, which was a drop of 478,000 barrels, or 8.7 percent, from the 5,520,000 daily rate of 1948. Total yield from U. S. fields was 1,840,307,000 barrels, while 2,020,185,000 barrels were taken in 1948.

Refining operations for the year were also down from the 1948 record level. Daily crude runs to stills averaged 5,330,000 barrels, while a year before they had amounted to 5,549,000 a day. That was a drop of 3.9 percent.

Continued expansion of the nation's natural gas industry was in evidence during 1949, as marketed production increased almost 2/3 trillion cubic feet over 1948 to total 5.8 trillion cubic feet.

Production of natural gasoline and allied products amounted to 428,000 barrels a day during the year, compared with 401,000 a day during 1948.

Petroleum imports rose to new highs in 1949, resulting in curtailments in domestic crude production in order to keep supplies in balance with demand. Crude imports amounted to 424,000 barrels daily, a gain of 20.1 percent over the 353,000 imported daily during 1948. Refined products entering the country totaled 217,000 barrels a day compared with 161,000 in the previous year. Total importations amounted to 641,000 daily for an increase of 24.7 percent over previous year's rate of 514,000 barrels. For the second straight year, the U. S. was a net importer and at the end of 1949, imports were exceeding exports by 560,000 barrels a day.

In line with the general return to a more normal operating level, the industry drilled fewer wells during 1949 than it had in the peak year 1948. New wells totaled 38,566, which was a decline of 911 wells, or 2.3 percent from the previous year's record 39,477. Not included in above totals were old wells drilled deeper, numbering 481 and 533, respectively.

Principal cause of the nation's drilling drop was lower crude prices in the Appalachian Region. However, slackened activity in this comparatively shallow drilling region, coupled with increased activity in some of the deeper areas, resulted in the greatest amount of footage ever drilled.

Exploratory drilling was carried on at record levels during 1949, with tests totaling 7482 compared with 7197 completed the previous year. As a result of the year's exploration, 959 new sources of oil, 121 new distillate sources, and 150 new gas pools were discovered.

A net increase of 9937 producing oil wells was made in 1949 to boost the nation's total to 449,545. However, average production per well dropped from 12.8 barrels in 1948 to 11 barrels.

Estimated crude reserves totaled 24,649,489,000 barrels at the end of 1949. That was a net gain of 1,369,045,000 barrels during the period.

A total of 12,564 miles of new pipe line was placed in operation during the year, which was 2257 miles less than the record-high added in 1948. The decrease was in crude and products lines, while gas carriers completed increased substantially.

Detailed data on U. S. operations are not presented in this issue as they were so thoroughly covered in the Review-Forecast Issue of February 15, 1950. Readers are referred to that issue for more complete information. A partial list of the data contained in the Review-Forecast Issue is presented in the table below.

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CENTRAL AMERICA

CENTRAL America experienced little petroleum activity during 1949, and indications are that little additional work will be done in the immediate future.

Guatemala's new petroleum law, which went into effect September 28, 1949, was instrumental in causing Standard Oil Company of Ohio, The Atlantic Refining Company, and The Ohio Oil Company to suspend operations and withdraw all personnel and equipment. The law provides that the government shall control all petroleum activities from exploration to distribution, and foreign companies may exploit petroleum resources only as agents of the government. The title to all equipment brought into the country for petroleum exploitation by foreign concerns reverts immediately to the government, with the companies to be reimbursed with oil payments, if oil is found.

Honolulu Oil Corporation began preliminary negotiations with the Costa Rican governing Junta in 1949 for an exploration and drilling concession of 200,000 hectares (494,200 acres) which could be chosen from any of several provinces in the country. Royalty payments were to be on a graduated scale from 10 to 15 percent of production. This agreement, however, was not approved by the Constituent Assembly and the company withdrew from further negotiations in October of 1949.

Sinclair Oil Company suspended operations in Panama in mid-1949 with no significant exploratory activity reported for the year. Preliminary geological exploration did not develop anything considered worthy of testing.

CUBA

CUBA's production failed to increase, output in 1949 totaling but 161,000 barrels.

Principal developments included the taking of exploration concessions by a group of American concerns on a large amount of acreage in Southern Cuba and the completion of an important wildcat. The Cuban Gulf Oil Company wildcat on Hicacos concession in Matanzas State, about two miles offshore in shallow waters of Cardenas Bay, eight miles north of the city of Cardenas, reported oil and gas showings in drilling to 5045 feet.

Most of Cuba's production was from the Jarahueca field in Las Villas State. Some drilling was carried on in the Bacuranao field, 12 miles east of Havana, but the field now is inactive. The Motembo field, noted for its extremely light naphtha-grade oil, also neared the inactive stage. They are the only producing fields in the country.

The country's three refineries, with total capacity of 4900 barrels daily, kept operating largely on imported crude.

DOMINICAN REPUBLIC and HAITI

NO EXPLORATION for oil was carried on in the Dominican Republic and Haiti during 1949. The countries have no production despite extensive drilling by Seabord Oil Company and The Atlantic Refining Company.

The Dominican Republic had a 5000-barrel-a-day refinery planned for 1949 but little actual construction was done.

TRINIDAD

TRINIDAD showed a slight increase in oil production of 268,489 barrels in 1949 for a total of 20,467,902 barrels as compared with 20,199,413 in 1948. The country has a cumulative total production of a little under 400 million barrels. The dollar shortage has reduced the amount of new drilling equipment and replacement parts available to Trinidad and only four wildcat wells were drilled during the year.

Development of existing fields has been the chief concern of the country under the present conditions and 144 field wells were drilled during the year in an effort to hold pro-

Trinidad — Engineering and Geological Data

FIELD	Proved Area (Acres)	Gravity of Oil (API)	PRODUCING FORAMATION						
			Name	Kind	Age	DEPTH (Ft.) Min. to Top of Pay	DEPTH (Ft.) Max. to Bottom of Pay	Average Thickness of Pay	Type of Structure
Barrackpore	400	17-30	Wilson	Sand	Miocene	500	3500	100	Faulted Anticline
			Herrera	Sand	Oligocene	3000	6000	250	Faulted Anticline
Brighton-Vessigny	1200	30	Morne L'Enfer, Forest	Sand	Miocene	700	2200	50- 70	Faulted Anticline
			Nariva	Sand	Oligocene	1800	4600	200	Faulted Anticline
Coora	750	15-49	Morne L'Enfer	Sand	Miocene	500	6500	20-150	Faulted Monocline
Cruse	250	13-30	Cruse	Sand	Miocene	1800	4000	200	Stratographic Trap
Erin	200	.....	Cruse	Sand	Miocene	3000	3850	.....	Syncline
Forest Reserve	3000	14-33	Forest	Sand	Miocene	0	3500	150	Anticline
			Cruse	Sand	Miocene	1500	8000	200	Anticline
Fyzabad	1600	16-34	Forest, Cruse	Sand	Miocene	127	7200	50-460	Anticline
Guapo	3400	14-24	Forest, Cruse	Sand	Miocene	250	2500	1800	Faulted Anticline
Guayaguayare & Maloney	110	15-49	Forest, Cruse	Sand	Miocene	0	5000	150	Faulted Trap
Morne Diablo	50	20-33	Cruse	Sand	Miocene	1000	4700	100	Faulted Trap
N. Los Bajos	200	27	Morne L'Enfer, Forest	Sand	Miocene	3000	6000	10-250	Faulted Monocline
Palo Seco	600	17-33	Forest, Cruse	Sand	Miocene	800	6000	20-250	Syncline
Penal	800	21	Forest, Cruse, Wilson	Sand	Oligocene	1300	2500	.....	Faulted Anticline
Point Fortin	1300	17-26	Forest, Cruse	Sand	Miocene	1600	8900	.....	Faulted Anticline
Quarry	400	15-49	Forest, Cruse	Sand	Miocene	500	6800	20-500	Faulted Trap
Quinam	40	25-34	Cruse	Sand	Miocene	1000	4300	100	Faulted Trap
San Francique	100	21	Forest, Cruse	Sand	Miocene	....	....	.....	.....
Siparia Syncline	410	19-45	Cruse	Sand	Miocene	7200	7950	40	Faulted Trap
Wilson	200	12-25	Wilson	Sand	Miocene	1200	3300	150	Faulted Anticline

(Aerial view of Carteret, N.J.)

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TRINIDAD—Continued

duction on an even keel. Total footage of the field wells increased to 587,800 feet in 1949 over the 1948 figure of 553,882 feet. A large number of the development wells were drilled to the deep Tertiary section where production comes from the Forest and Cruse sands.

Four wildcats were drilled in 1949 to depths below 9000 feet. Two dry holes were drilled, one to 10,056 feet in the Tableland field and one to 9426 feet in the Balata field. Both were drilled by The United British Oilfields of Trinidad, Ltd. One inconclusive test was drilled to 12,161 feet in the Otaheite area by the National Mining Corporation, Ltd., and one test near Erin was drilled to 11,557 feet by Trinidad Petroleum Development Company, Ltd.

Some of Trinidad's fields extend down to the water's edge, and the possibility of offshore production is considered good.

Geophysical surveying has been carried on in the island in the entire area south of the Northern Range. The territorial waters from Claxton Bay around the Cedros Peninsula to Islote Point and an area in the Gulf of Paria have been covered. Also, a gravimetric survey has been made of a 241-square-mile area in the south of the island covering the region from Erin Basin eastward to Tableland and Moruga.

Refineries of Trinidad

COMPANY	Location of Plant	Crude Charging Capacity (Bbls. Daily)	Cracking Capacity (Bbls. Daily)	Type of Refinery
General Asphalt Co.	La Brea	1,000	None	Asphalt
Trinidad Leaseholds, Ltd.	Pointe-à-Pierre	75,000	50,000	Complete
Trinidad Pet. Dev., Ltd.	Brighton	1,300	None	Skimming
United British Oilfields of Trinidad, Ltd.	Point Fortin	30,000	None	Skimming, Asphalt

Pipe Lines of Trinidad

COMPANY	Origin	Terminus	Length (Miles)	Diameter (Inches)	Year Completed
CRUDE OIL LINES:					
Trinidad Leaseholds, Ltd.	Forest Reserve	Pointe-à-Pierre	16.3	10	1928
	Forest Reserve	Pointe-à-Pierre	16.3	8	1938
	Guayaguayare	Phillippine	27.5	6	1922
	Palo Seco	Forest Reserve	4.4	4	1934
	Morne Diablo	San Francique	5.7	4	1936
	Cruse	Forest Reserve	5.5	6	1944
Trinidad Pet. Dev. Co., Ltd.	Los Bajos	Point Fortin	8.8	(1)-6; (1)-4	1933
	Palo Seco	Sobo La Brea	11	5	1930
	Palo Seco	Erin	5	4	1948
	Palo Seco	Los Bajos	3	6	1938
	Barrackpore	Penal	3	4	1949
	Coora	Los Bajos	6	(2)-4	1938
United British Oilfields of Trinidad, Ltd.	Penal	Point Fortin	18	8	....
	Quarry	Point Fortin	7.5	6	....
	Los Bajos	Point Fortin	8	(1)-6; (1)-4	....
	Morne Diablo	Los Bajos	5	(2)-4	....
	Brighton and Guapo	Quarry	23	6	....
NATURAL GAS LINES:					
Trinidad Leaseholds, Ltd.	Forest Reserve	Pointe-à-Pierre	16	12	1948
Trinidad Pet. Dev. Co.,Ltd.	Coora	Los Bajos	6	(1)-8; (1)-6	1938
REFINED PRODUCTS LINES:					
Apex (Trinidad) Oilfields, Ltd.	Fyzabad	Point Fortin	12	2	1930

Drilling in Trinidad

FIELD	WELLS COMPLETED IN 1948 Oil	Dry	TOTAL Wells	Footage	WELLS COMPLETED IN 1949 Oil	Gas	Dry	TOTAL Wells	Footage	Wells Drilling End of 1949
Barrackpore	5	....	5	27,813	1	....	....	1	3,905	2
Brighton-Vessigny	11	....	11	n.a.*	10	....	1	11	57,574	2
Coora	8	....	8	35,333	8	....	....	8	33,946	..
Cruse	3	....	3	11,112	....	....	....	....	....	1
Erin	2	....	2	9,727	1	....	....	1	5,014	..
Forest Reserve	23	2	25	97,034	24	1	....	25	91,273	2
Fyzabad	10	....	10	50,915	12	....	1	13	39,105	1
Guapo	....	....	....	....	6	....	....	6	23,440	1
Guayaguayare & Maloney	2	....	2	2,595	....	....	1	1	3,217	..
Morne Diablo	....	....	....	....	1	....	....	1	10,850	..
N. Los Bajos	....	....	....	....	....	....	....	....	....	..
Palo Seco	1	....	1	9,559	9	....	....	9	40,154	..
Penal	17	1	18	74,878	14	....	1	15	57,887	2
Point Fortin	26	1	27	112,529	17	....	3	20	79,511	3
Quarry	14	1	15	78,238	19	....	2	21	81,148	3
San Francique	....	....	....	....	....	....	1	1	1,200	..
Siparia Syncline	2	....	2	18,181	2	....	....	2	16,437	1
Wilson	3	....	3	8,140	4	....	....	4	10,796	..
Wildcats	1	1	2	17,768	1	....	4	5	32,343	..
Total	128	6	134	553,822	129	1	14	144	587,800	18

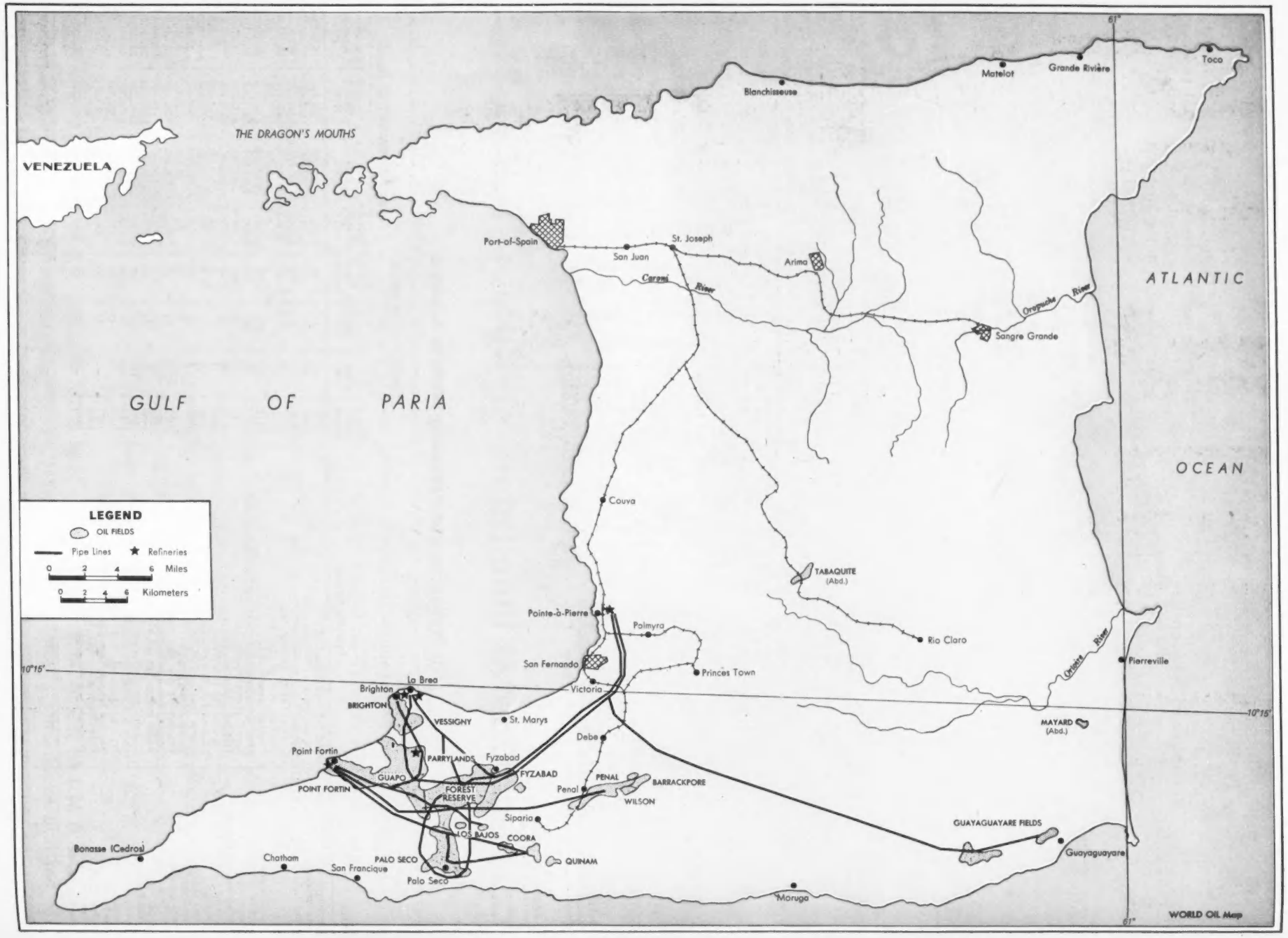
*n.a.—Not Available.

Oil Production and Producing Wells in Trinidad

FIELD	Operating Company	Year of Discovery	PRODUCING OIL WELLS END OF 1949 Flowing	Art. Lift	Total Producing	CRUDE OIL PRODUCTION (Barrels) Daily at End 1949	Year 1948	Year 1949	Cumulative Through 1949
Barrackpore	Trinidad Leaseholds, Ltd.	1918	12	31	43	1,477	568,443	539,144	7,502,154
Brighton-Vessigny	Antilles Pet. Co. (Trinidad), Ltd.	1909	45	45	90	1,311	587,694	635,019	7,457,131
Coora	Trinidad Pet. Dev. Co., Ltd.	1936	42	67	109	2,654	1,162,775	1,088,421	16,338,111
Cruse	Trinidad Central Oilfields, Ltd.	1913	21	69	90	1,352	768,132	793,762	15,734,984
Erin	Trinidad Pet. Dev. Co., Ltd.	1948	....	1	1	9	5,996	3,320	9,316
Forest Reserve	Trinidad Leaseholds, Ltd.	1914	140	262	402	14,216	5,050,174	5,189,025	96,023,802
Fyzabad	Apex (Trinidad) Oilfields; National Mining Corp., Ltd.	1920	45	341	386	5,900	2,476,623	2,267,483	85,527,516
Guapo	Kern Trinidad Oilfields, Ltd.	1912	24	99	123	1,285	453,780	447,034	14,254,991
Guayaguayare & Maloney	Trinidad Leaseholds, Ltd.	1902	15	55	70	927	398,457	338,778	8,921,301
Mackenzie	Trinidad Pet. Dev. Co., Ltd.	1949	1	....	1	88	79	15,215	15,294
Mandingo	Trinidad Pet. Dev. Co., Ltd.	1948	1	....	1	6	3,803	6,011	9,814
Morne Diablo	Siparia Trinidad Oilfields, Ltd.; Trinidad Leaseholds, Ltd.	1936	3	20	23	333	98,727	121,860	2,344,230
New Dome	United British Oilfields of Trinidad, Ltd.	....	....	9	9	85	26,862	32,831	2,301,500
North Los Bajos	Trinidad Pet. Dev. Co., Ltd.	1937	3	21	24	290	116,944	101,420	3,055,659
Palo Seco	Trinidad Pet.; National Mining; Siparia Trinidad	1926	39	188	227	2,194	571,980	779,869	23,488,455
Penal	United British Oilfields of Trinidad, Ltd.	1935	42	52	94	6,264	2,375,508	2,356,739	15,551,800
*Point Fortin	United British Oilfields of Trinidad, Ltd.	1908	168	134	302	8,619	2,932,370	3,043,211	59,803,400
Quarry	Apex (Trinidad) Pet. Oilfields; Trinidad Pet. Dev.	1938	54	70	124	4,639	1,594,893	1,518,299	16,101,989
Quinam	Trinidad Leaseholds, Ltd.	1936	2	12	14	306	82,843	111,703	1,303,009
San Francique	National Mining; United British Oilfields of Trinidad	1922	....	48	48	489	188,988	180,894	5,727,937
Siparia Syncline	Apex (Trinidad) Oilfields, Ltd.	1945	7	....	7	1,200	331,400	431,600	963,300
Wilson	Trinidad Central Oilfields, Ltd.	1918	8	29	37	1,277	402,942	466,264	3,594,690
Abandoned Fields	....	....	....	....	....	....	....	....	4,853,537
Total	....	....	672	1,553	2,225	54,921	20,199,413	20,467,902	390,883,920

* Point Fortin contains Los Bajos production for 1948, and 1949, Los Bajos accumulative production through 1949, 380,537 bbls

TRINIDAD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VENEZUELA
GULF OF PARIA
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Blanchisseuse
Matelot
Grande Rivière
Toco
Port-of-Spain
San Juan
St. Joseph
Arima
Caroni River
Oropuche River
Sangre Grande
Couva
TABAQUITE (Abd.)
Rio Claro
Pointe-à-Pierre
Palmyra
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Princes Town
Victoria
La Brea
Brighton
BRIGHTON
VESSIGNY
St. Marys
Debe
Point Fortin
PARRYLANDS
Fyzabad
FYZABAD
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Penal
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Siparia
LOS BAJOS
COORA
QUINAM
PALO SECO
Palo Seco
Chatham
San Francique
Bonasse (Cedros)
Moruga
GUAYAGUAYARE FIELDS
Guayaguayare
Ortoire River
Pierreville
MAYARO (Abd.)
10°15'
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LEGEND
OIL FIELDS
Pipe Lines
Refineries
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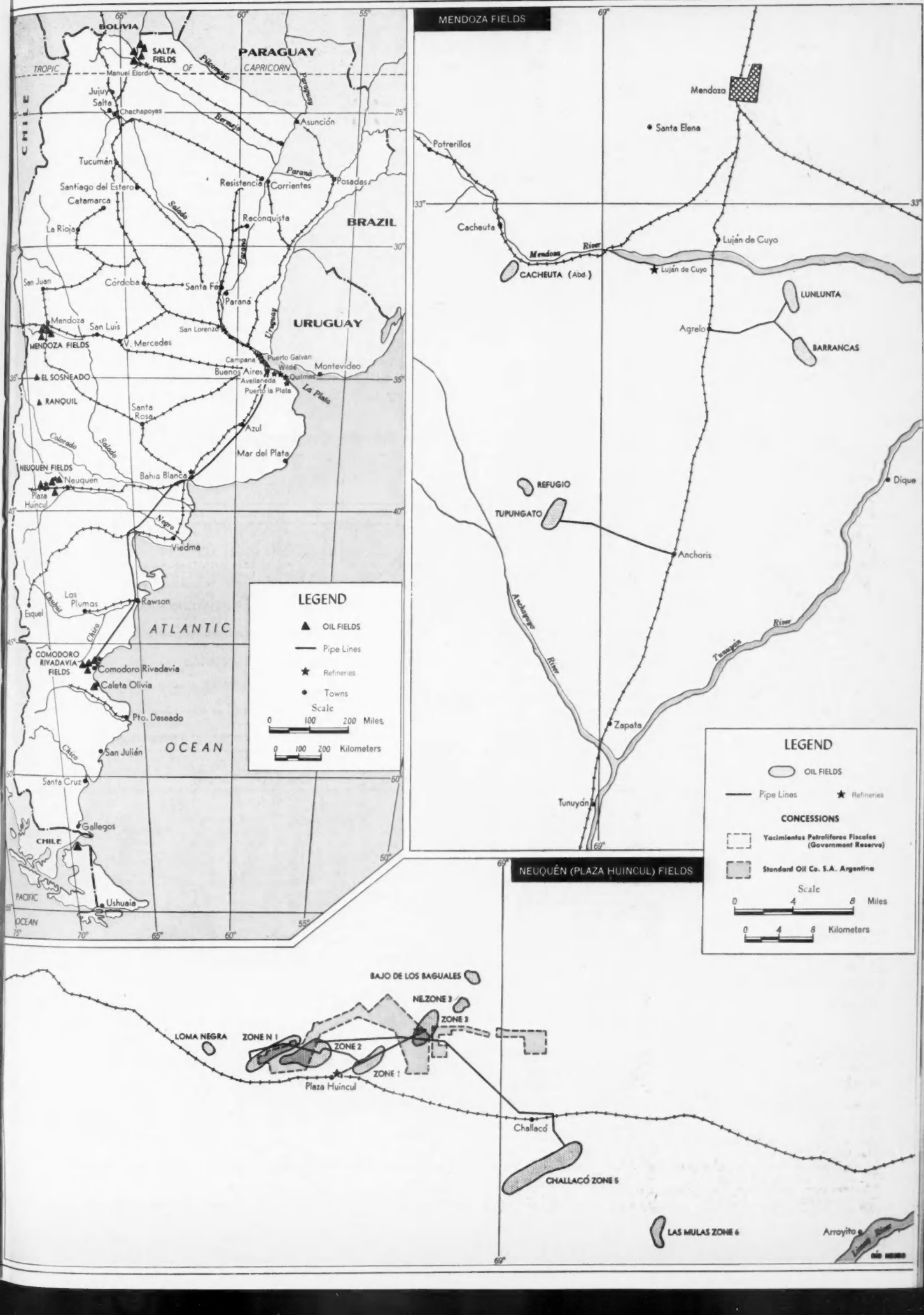
0 2 4 6 Kilometers
WORLD OIL Map

ARGENTINA—Mendoza and Neuquén (Plaza Huincul) Fields and Concessions



ARGENTINA

ARGENTINA'S oil production dropped in 1949 to 22,589,967 barrels as compared with 23,252,726 barrels in 1948. This decrease is further reflected in the daily average figure at the end of 1949 of 63,170 barrels as compared with 71,765 barrels daily at the same time in 1948. Unless new fields are soon discovered and developed, Argentina will have difficulty approaching its highest productive year, 1944, when 27,714,000 barrels of oil were produced.

The decrease in output last year was due largely to the drop in the Comodoro Rivadavia field's production. Operated by Yacimientos Petroliferos Fiscales (YPF), the government owned company, the field probably would have increased its annual output last year but for a labor strike in all of YPF's fields early in the year. Private oil companies operating in Argentina had difficulty securing drilling equipment and decreased development cut down their output during the year. Some of this problem is being solved by the government through its National Economic Council by granting permits to YPF and private companies for the import of needed drilling equipment from both dollar and sterling sources. YPF is currently trying to purchase some of the equipment from soft currency countries such as Western Germany, Austria, the Netherlands and France.

Private companies in Argentina must confine their drilling operations to the lands granted them 25 years ago, and as most shallow production has been drilled up, the companies are now seeking deeper productive zones. The Compania Astra de Petroleo, a private concern holding concessions in the Comodoro Rivadavia region, is now drilling a wildcat below 6000 feet about 12 miles from the Comodoro Rivadavia field proper. Standard Oil Company of Argentina also has two deep tests drilling, one at San Pedro and the other at Plaza Huincul. YPF has announced a wildcat success at Punta Peidras, Comodoro Rivadavia, at 7613 feet. The company also announced a new field discovery at Loma Negra in Neuquen Province about 7.2 miles west of Plaza Huincul when the first well drilled there found oil between 3580 and 3630 feet. Completed in October, 1949, the well tested 180 barrels daily initially. YPF also claimed to have found a new field in the Argentine Tierra del Fuego which is believed to be an extension of Chile's Spring Hill field. The discovery well tested 12 million cubic feet of gas and some

Argentina Crude Oil Production by Regions, YPF and Private Companies, for Recent Years

Year	GOBERNACIÓN MILITAR COMODORO RIVADAVIA		NEUQUÉN		SALTA		MENDOZA		TOTAL		Grand Total
	YPF	Private[1]	YPF	Private[2]	YPF	Private[2]	YPF	Private[3]	YPF	Private	
Prior to 1944	137,499,041	100,289,709	10,724,155	10,975,559	6,514,912	16,636,947	12,604,982	319,236	167,343,090	128,221,451	295,564,541
1944	10,226,615	6,875,895	1,923,249	445,005	961,366	682,081	3,094,396	21,292	16,205,626	8,024,273	24,229,899
1945	9,722,422	6,411,066	1,964,141	382,061	665,281	618,949	3,102,020	14,999	15,453,864	7,427,105	22,880,969
1946	8,747,176	5,680,285	1,936,628	343,962	466,586	556,074	3,063,475	8,214	14,213,865	6,588,535	20,802,400
1947	9,913,889	5,789,870	2,024,889	295,039	471,436	494,388	2,847,540	8,800	15,257,754	6,588,097	21,845,851
1948	10,532,228	5,781,416	2,429,502	304,801	503,464	513,835	3,178,318	8,762	16,643,912	6,608,814	23,252,726
1949	10,075,102	5,618,867	2,442,155	250,512	434,111	482,858	3,277,442	8,553	16,234,301	6,360,918	22,595,219
Cumulative to 12-31-49	196,716,038	136,425,147	23,815,138	12,997,951	10,017,008	19,985,112	31,164,261	390,943	261,712,445	169,799,153	431,511,598
Daily Average Production, 1949	27,941	15,349	7,133	658	1,291	1,293	9,505	.....	45,870	17,300	63,170

[1] Astra, Diadema, and Ferrocarrilera. [2] Standard. [3] El Sosneado

Oil Production and Producing Wells in Argentina

PROVINCE and FIELD	COMPANY	Year of Discovery	PRODUCING OIL WELLS END OF 1949			CRUDE OIL PRODUCTION—(Barrels)			
			Flowing	Art Lift	Total	Daily End of 1949	Year 1948	Year 1949	Cumulative Through 1949
GOBERNACIÓN MILITAR COMODORO RIVADAVIA:									
Astra	Astra Cía. Argentina de Petróleo	1914	.....	253	253	3,472	1,264,743	1,263,743	26,343,583
Comodoro Rivadavia	Yacimientos Petroliferos Fiscales (Y.P.F.)	1904	n.a.	n.a.	n.a.	25,235	9,604,151	9,183,450	194,845,861[1]
Cañodón Seco	Y. P. F.	1945	n.a.	n.a.	n.a.	2,706	928,077	892,000	1,820,077[2]
José Segundo	Cía. Ferrocarrilera de Petróleo	1922	.....	16	16	57	34,562	29,318	703,354
Manantiales Rosales	Cía. Ferrocarrilera de Petróleo	1922	.....	116	116	554	230,057	209,199	7,972,323
Kilómetro 8	Cía. Ferrocarrilera de Petróleo	1915	.....	242	242	825	334,102	266,344	25,898,974
Kilómetro 27	Diadema Argentina S. A. de Petróleo	1925	.....	433	433	9,830	3,682,407	3,630,000	70,949,600
Reserva	Cía. Ferrocarrilera de Petróleo	1928	.....	2	2	6	4,429	3,176	139,638
Sindicato	Cía. Ferrocarrilera de Petróleo	1928	.....	34	34	175	76,665	63,724	1,161,562
Solano	Cía. Ferrocarrilera de Petróleo	1924	.....	87	87	430	154,451	153,363	3,256,113
MENDOZA:									
El Sosneado	Cía. Río Autel "El Sosneado"	1926	.....	19	19	.....	8,762	8,567	390,943
Mendoza (Barrancas and Lunlunta)	Y. P. F.	1938	n.a.	n.a.	n.a.	9,505	3,178,318	3,277,442	31,164,261
Tupungata	Y. P. F.	1933							
GOBERNACIÓN DE NEUQUÉN:									
Dadin	Standard Oil Co. S. A. Argentina	1925	.....	25	25	301	109,207	109,080	8,166,932
Plaza Huincul	Standard Oil Co. S. A. Argentina	1924	6	43	49	357	195,594	141,434	4,831,019
Plaza Huincul	Y. P. F.	1924	n.a.	n.a.	n.a.	7,133	2,429,902	2,442,155	23,815,138
Challacó	Y. P. F.	1940							
SALTA:									
Agua Blanca	Standard Oil Co. S. A. Argentina	1926	.....	3	3	60	26,677	22,889	1,328,185
Cerro Tartagal	Standard Oil Co. S. A. Argentina	1927	.....	2	2	10	10,977	9,628	114,689
Lomitas	Standard Oil Co. S. A. Argentina	1927	.....	25	25	168	73,205	62,946	3,491,415
Ramos	Standard Oil Co. S. A. Argentina	1937	.....	2	2	17	7,031	6,253	77,851
San Pedro	Standard Oil Co. S. A. Argentina	1928	1	23	24	1,038	395,945	381,145	14,972,972
Río Pescado	Y. P. F.	1933							
Tranquitas	Y. P. F.	1928	n.a.	n.a.	n.a.	1,291	503,464	434,111	10,017,008
Vespucio	Y. P. F.	1928							
Total	.....	....	7	1,325	1,332	63,170	23,252,726	22,589,967	431,511,498

NOTE: n.a.—Not available.
[1] Includes production Cañodón Seco, 1945-1947.
[2] 1948 and 1949.

AXELSON FIRST CHOICE

IT TAKES THE BEST OF EVERYTHING TO MAKE A COUPLING

Knowledge of metallurgy, experience in field operation, and the ability to control physical characteristics throughout manufacturing processes, makes it possible for AXELSON to deliver sucker rod couplings that best suit specific pumping conditions.

PRECISION MACHINING

Threading operation is performed after heat treatment to avoid possible distortion, and threads are precision machined in absolute alignment to insure a straight pull. End faces are ground perfectly square with the thread, making correct preloading possible when the rod string is made up. Hardened outside diameter is accurately ground, and assures the highest possible wear resistance.

METALLURGY

Material used in AXELSON hardened and ground sucker rod couplings consists of a nickel-molybdenum alloy steel. Careful analyses are made on all steel stock to insure the high quality necessary to meet AXELSON standards. AXELSON couplings are heat-treated to a high surface hardness by a special process that leaves a tough, ductile core for accurate threading.

FIELD PERFORMANCE

55 years of customer acceptance is behind every AXELSON coupling. In that time, every type of field test has proved AXELSON couplings to be uniform, of controlled quality materials, and manufactured to precision specifications – guaranteeing longer string life.

AXELSON FIRST CHOICE

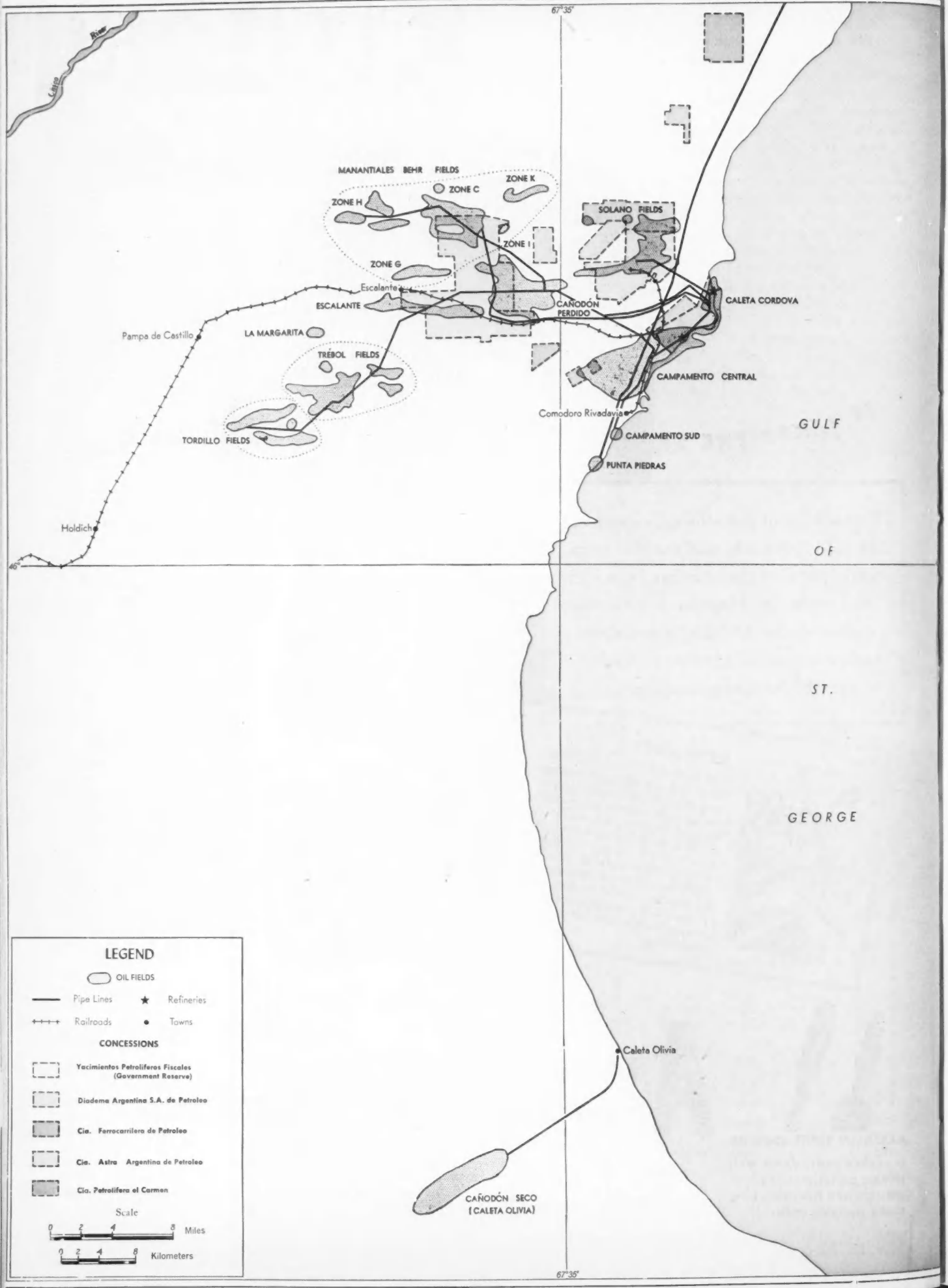
in sucker rods, deep well plunger pumps, pumping components and hydraulic long stroke pumping units.

SUCKER ROD AXELSON *Couplings*

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

AXELSON MANUFACTURING CO.—PLANTS—Los Angeles 58; St. Louis 16—OFFICES New York City 7; Tulsa 1; Buenos Aires, Argentina; Caracas, Venezuela—DISTRIBUTORS—Jones & Laughlin Supply Co.; Great Northern Tool & Supply Co.; Industrial Agencies, Ltd., San Fernando Trinidad, B.W.I.; Industrias Waldrip & Campbell, Barcelona and Maracaibo, Venezuela; Dominion Oil Field Supply Co., Ltd., Calgary, Canada.

ARGENTINA—Comodoro Rivadavia Fields and Concessions



Performance Proven Products

WILSON Packers

Type "LB"

Type "MB"

Type "T"

There is a Wilson Packer to best meet every condition encountered in producing a well. More and more, the Industry is finding a Wilson Packer to be the safest and most economical to use.

The Wilson "Positive Seal" Hook-Wall Packer, Type "LB," is simple in design, compact, light in weight, and "fool proof" in setting.

Three friction blocks, hard faced with stellite, are used in place of friction wiper springs. These friction blocks are held against the wall of casing by three rugged coil springs—and insure correct setting regardless of depth.

The Wilson Type "MB" (Metal Block) Packer is especially designed for very deep production—where hydrostatic head is greater than the bottom hole pressure. It is especially designed to prevent all cold flow of rubber between the casing and the outside diameter of the tool.

In going-in and coming-out of the hole, the metal block is retracted to the same diameter of the packer. In setting the Packer, the segments expand against the casing at the same time as the slips are set.

The Wilson "Type T, Upside Down" Packer sets by pulling up on the tubing instead of by weight on the tubing.

For testing leaks; for acidizing; for high pressure gas wells, where the bottom hole pressure is greater than the hydrostatic head—the Wilson "Upside Down" Packer has no equal.

NIXON Gas Lifts

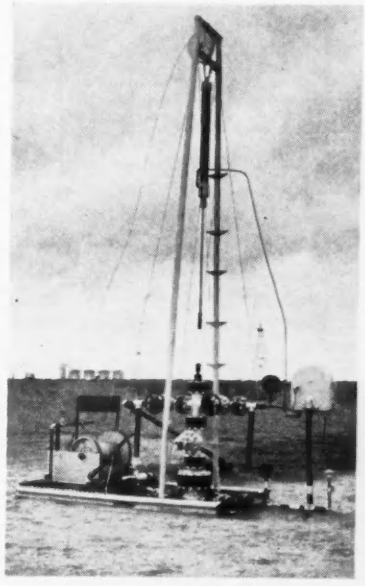
For low fluid level wells, the Nixon "Wire Line" Surface Control Gas Lift Unit is unequalled for efficiency and economy.

This has been proven in hundreds of wells over a period of many years.

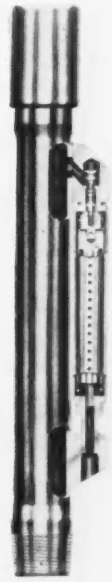
Equipped with this unit a well produces the fluid only against flow line pressure, as all high pressure gas is confined above the tubing Packer.

For medium and high producing fluid level wells, where the amount of fluid to be produced does not exceed the capacity of the tubing. . . . Nixon "Weight Loaded" Gas Lift Tubing Flow Valves are recommended.

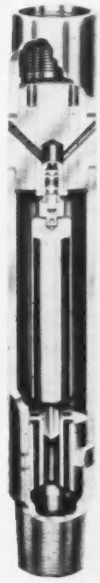
When wells are located in heavy water drive fields, where it is necessary to produce more fluid than can be handled thru the tubing, Nixon "Weight Loaded" Gas Lift Casing Flow Valves really do the job.



Nixon *"Wire Line"* Surface Control Gas Lift



Nixon Tubing Flow Valve



Nixon Casing Flow Valve

Contact Your Nearest Wilson Supply Store or Write:

WILSON SUPPLY COMPANY

1412 Maury St.

HOUSTON, TEXAS

Branch Stores

TEXAS—Alice, Corpus Christi, Victoria, Bay City, Columbus, Barbers Hill, Liberty, Beaumont, Kilgore, Monahans. LOUISIANA—Lake Charles, New Iberia, Houma, Harvey, Shreveport. ARKANSAS—Magnolia.

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ARGENTINA—Continued

distillate at a depth of 6435 feet, or about 1000 feet higher than Spring Hill production. Some YPF operations have been under strict censorship, for example, a wildcat well at La Esperanza in the Gobernacion de Santa Cruz is being drilled tight, as well as a test being drilled at Colonia Sarmiento, west of Comodoro Rivadavia. It is rumored that a wildcat at Malargue, Mendoza, and one at Jaguel, in the same state, are both temporarily shut down with junked hole. Drilling and Exploration Company of Dallas is doing the contract drilling on these wells for YPF.

The oil properties of Ferrocarrilera, the English railroad company formerly operated in Argentina, were to have been

Engineering and Geological Data on Argentina Fields

PROVINCE and FIELD	Est. Proved Area (Acres)	Gravity Oil (API)	PRODUCING FORMATION						Type Structure
			Local Name	Kind	Geologic Age	Minimum to Top of Pay	Maximum to Bottom of Pay	Average Thickness of Pay (Feet)	
GOBERNACIÓN MILITAR COMODORO RIVADAVIA:									
Astra	2,965	22	Glauconitico	Sand	Upper Cretaceous	1740	3280	50	Faulted Anticline
Campamento Sud	300	20	Glauconitico	Sand	Upper Cretaceous	1917	2300	26	Anticline
Cañcdón Seco	4,000	30	.....	Sand	Jurassic	4085	5612	10	Faulted Anticline
Col. Sarmiento	20	23	Glauconitico	Sand	Upper Cretaceous	2310	2640	26	Faulted Anticline
Costa	13,840	20	Glauconitico	Sand	Upper Cretaceous	1815	2805	30	Faulted Anti-line
El Trébol	14,500	23	Glauconitico	Sand	Upper Cretaceous	3878	5960	33	Faulted Anticline
Escalante	18,640	23	Glauconitico	Sand	Upper Cretaceous	2260	4290	33	Faulted Anticline
José Segundo	90	16	Lignitifero	Sand	Lower Cretaceous	2300	3970	30	Faulted Anticline
Kilometro 8	3,900	19	Galuconitico	Sand	Lower Cretaceous	1675	1965	50	Anticline
Kilometro 27	9,975	24	Chubutiano	Sand	Upper Cretaceous	3088	3372	..	Anticline
Manantiales Rosales	2,400	19	Glauconitico	Sand	Lower Cretaceous	1975	3900	26	Faulted Anticline
Reserva	75	18	Continental	Sand	Lower Cretaceous	1750	1985	15	Anticline
Sindicato	415	18	Glauconitico	Sand	Upper Cretaceous	2965	3030	15	Anticline
Solano	5,000	20	Glauconitico	Sand	Lower Cretaceous	1540	2920	35	Faulted Anticline
MENDOZA:									
Cacheuta	700	31	Victor "C" & Potrerillos	Sand	Triassic	1940	3080	13	Monocline
Lunlunta (Barrancas)	1,446	28	Potrerillos Tillita	Sand	Triassic	7720	7890	45	Anticline
Sosneado	150	13	Victor	Sand	Triassic	544	551	..	Monocline
Tupungato	645	30	Victor	Sand	Triassic	5870	6310	69	Anticline
NEUQUÉN:									
Bajo de los Baguales	300	38	Dogger	Sand	Jurassic	3383	3386	20	Monocline
Centro Octógono	150	32	Dogger	Sand	Jurassic	1880	1950	40	Monocline
Challacó	1,688	22	Dogger	Sand	Jurassic	3300	3425	66	Faulted Anticline
Dadin	325	33	Dogger	Sand	Jurassic	1990	2320	40	Lenses
Laguna Colorado	750	33	Dogger	Sand	Jurassic	2450	2610	56	Monocline
Oeste Octógono	1,800	31	Dogger	Sand	Jurassic	2300	2365	33	Monocline
Plaza Huincul	2,157	30	Dogger	Sand	Jurassic	2200	2500	26	Anticline
SALTA:									
Agua Blanca	49	21	Tarija	Sand	Permian	2300	3600	33	Lenses
Lomitas	576	44	Tarija	Lime	Permian	....	2185	..	Anticline
Ramos	30	51	Devonico	Sand	Devonian	2900	3930	30	Faulted Anticline
Rio Pescado	62	49	Terciario	Sand	Tertiary	4175	4376	103	Anticline
San Pedro	504	45	Tarija Tupambi	Sand	Permian	1800	3300	60	Anticline
Tartagal	40	42	Escarpment Tarija Devonico	Limestone, Sand	Permian	....	2350	..	Anticline
Tranquitas	3,053	..	Gondwana	Lime	Permian	1950	2350	200	Faulted Anticline

Drilling in Argentina

PROVINCE and FIELD	COMPANY	WELLS COMPLETED IN 1948					WELLS COMPLETED IN 1949					Wells Drilling End of 1949
		Oil	Gas	Dry	TOTAL Wells	TOTAL Footage	Oil	Gas	Dry	TOTAL Wells	TOTAL Footage	
GOBERNACIÓN MILITAR COMODORO RIVADAVIA:												
Astra	Astra Cía. Argentina de Petróleo	12	..	3	15	71,759	13	..	..	13	54,866	2
Kilómetro 8	Cía. Ferrocarrilera de Petróleo	2	1	..	3	4,904	..	2	..	2	3,980	..
Kilómetro 27	Diadema Argentina S. A. de Petróleo	26	..	2	28	107,352	23	..	1	24	89,664	2
Manantiales Rosales	Cía. Ferrocarrilera de Petróleo	6	..	..	6	10,729	3	..	..	3	12,760	..
Salamanca	Cía. Ferrocarrilera de Petróleo	..	1	..	1	1,264	..	1	..	1	1,522	..
Solano	Cía. Ferrocarrilera de Petróleo	11	1	2	14	29,180	10	..	3	13	24,476	..
Wildcats	Astra Cía. Argentina de Petróleo	..	..	..	..	.....	1	..	..	1	5,970	..
	Yacimientos Petroliferos Fiscales (Y.P.F.)	..	..	..	..	.....	9	1	n.a.	n.a.	n.a.	n.a.
MENDOZA:												
El Sosneado	Cía. Río Autel "El Sosneado"	..	..	4	4	2,287	..	..	..	..	.....	..
Wildcats	Y. P. F.	..	..	..	..	.....	n.a.	n.a.	n.a.	3	n.a.	n.a.
NEUQUÉN:												
Plaza Huincul	Standard Oil Co. S. A. Argentina	..	1	..	1	3,018	..	..	..	..	.....	1
Plaza Huincul	Y. P. F.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Challacó												
Wildcats	Y. P. F.	..	..	..	..	.....	1	..	..	1	3,630	n.a.
SALTA:												
San Pedro	Standard Oil Co. S. A. Argentina	1	..	..	1	2,943	2	1	..	3	4,011	1
Río Pescado	Y. P. F.	..	..	1	1	4,614	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Tranquitas	Y. P. F.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Vespucio												
SANTA CRUZ:												
La Esperanza	Y. P. F.	..	..	..	..	.....	n.a.	n.a.	n.a.	1	n.a.	n.a.
TIERRA DEL FUEGO:												
Río Grande	Y. P. F.	..	..	..	..	.....	..	1	..	1	6,435	..
Total		58	4	12	74	238,050	62	6	4	76	207,314	6

NOTE: n.a.—Not available.

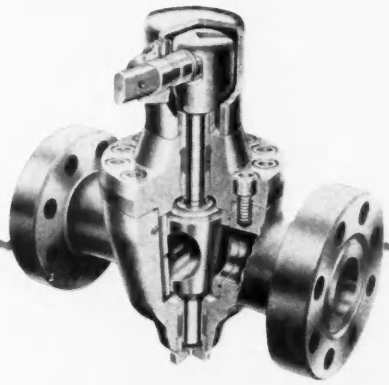
THIS SEPARATE AND REPLACEABLE SEAT

PROVIDES

3 BIG ADVANTAGES

IN THE NEW

Cameron NON-LUBRICATED LIFT-PLUG VALVE



THE BEST FEATURES OF PLUG AND GATE VALVES COMBINED WITH NEW CAMERON INNOVATIONS

- NON-LUBRICATED—no grease of any kind required to effect a seal; also reduces chance for human error and need for maintenance.
- PRESSURE SEALING—when plug is seated, line pressure automatically forces seat into tighter engagement with plug.
- UNIQUE LIFT-PLUG ACTUATOR—a novel mechanical design which lifts, turns and reseats plug in continuous turn of a lever.
- RENEWABLE SEAT AND PLUG—easily replaced; permits any desired trim.
- FIELD REPAIR—can be completely overhauled without removal from line; no special tools or skill required.
- EASY OPERATION—requires less operating effort than other valve designs.
- FORGED STEEL—all parts, including body, are press or drop forged from specification materials.

A TIGHT SEAL

When the Cameron "LP" Valve is in closed position the plug is firmly wedged into the seat to secure a primary metal-to-metal seal. Then, line pressure exerts forces on an exterior portion of the separate seat to press it into even closer sealing contact with the plug. The seat and body being separate members, body distortion cannot separate the seating surfaces.

EASY FIELD REPAIR

Here, again, the separate and replaceable seat of the Cameron "LP" Valve provides an important advantage over conventional valves having seats made integrally with the body. No skill or special tools are required to completely overhaul the "LP" Valve, and it is not necessary to remove the valve from the line. (See above.)

ANY DESIRED TRIM

Obviously, the seat of the "LP" Valve which is separate and not attached to the body permits the selection of trim materials best suited for the service conditions.

Completely descriptive literature and dimensional data will gladly be sent to interested operators upon request.

Cameron IRON WORKS, INC.

P. O. BOX 1212 HOUSTON, TEXAS

EXPORT: 74 TRINITY PLACE, NEW YORK, N. Y.

simple PIPE LINE hold downs

Grip-Tite Stearns

PIPELINE ANCHOR ASSEMBLY

"The only positive expanding anchor"

TAILORED TO FIT THE JOB

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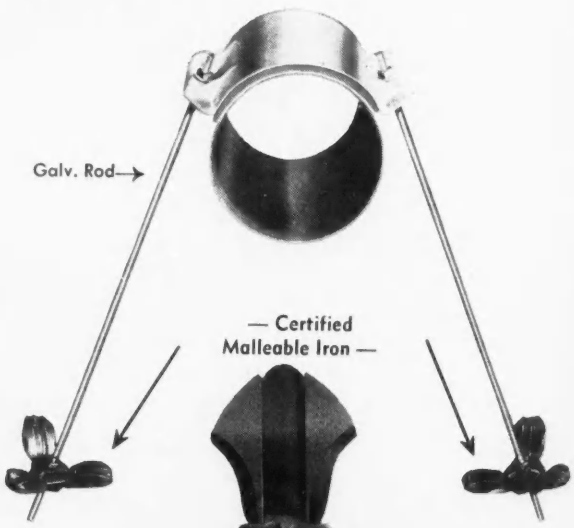
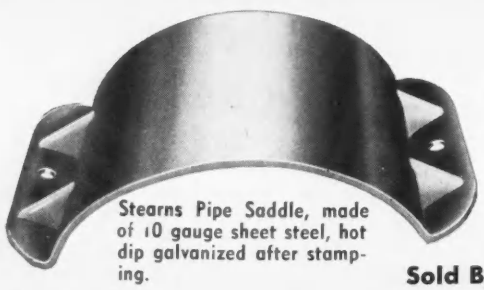
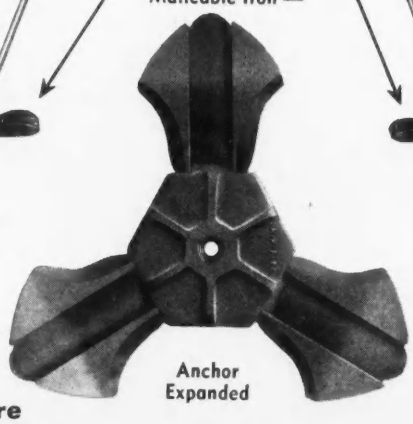


Assembly patented



Stearns Pipe Saddle, made of 10 gauge sheet steel, hot dip galvanized after stamping.



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Sales Manager
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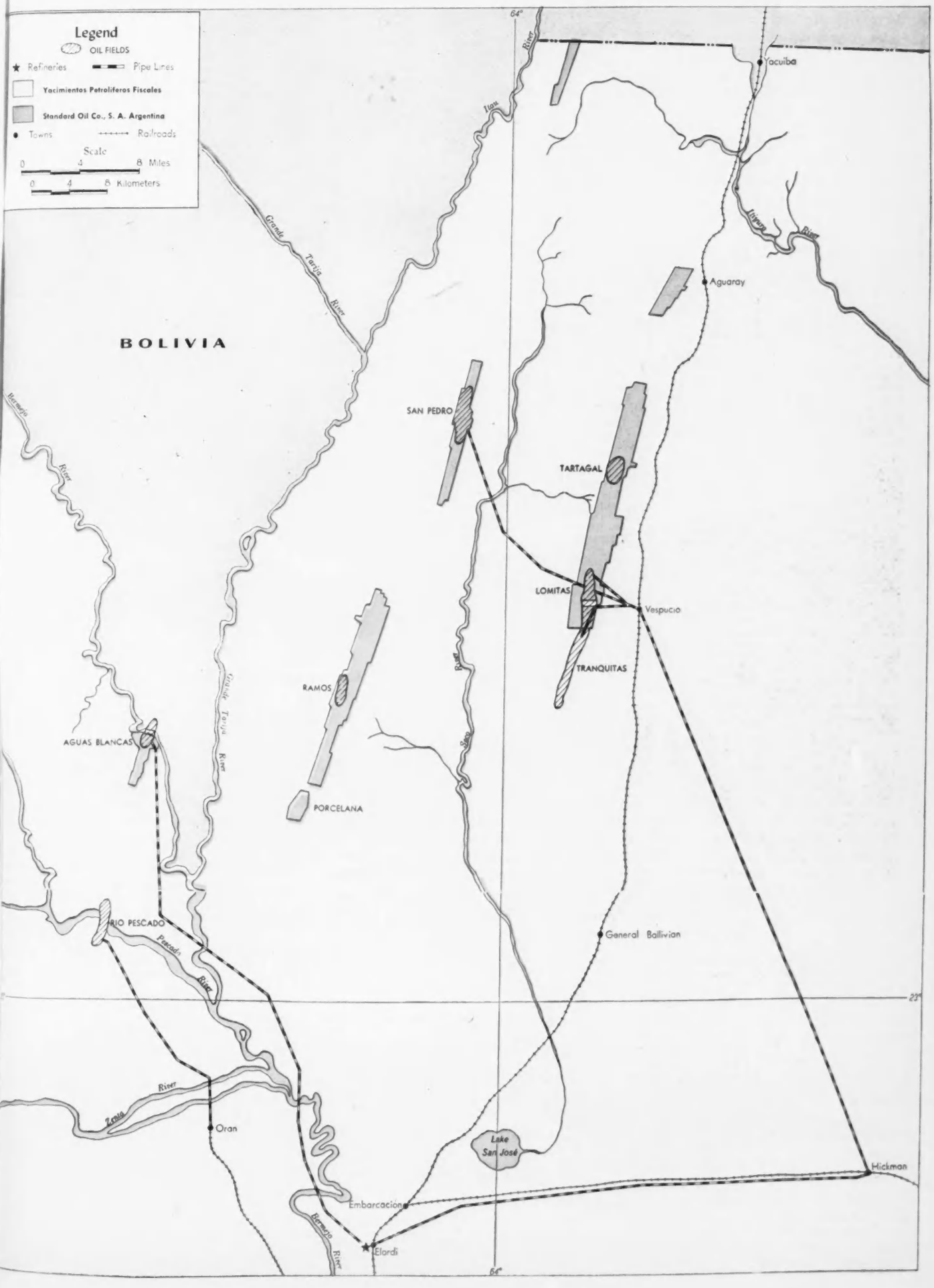
ARGENTINA—Salta Fields and Concessions



ARGENTINA—Continued

transferred to YPF in 1948 but the company is still being operated by the same technical staff as before.

The Argentine government must institute an active program of exploration and exploitation of oil resources if the country is to overcome its present deficit production. Imports into the country in the pre-war years were about 40 percent of consumption; in 1948, imports were about 58 percent, and in 1949 the imports exceeded 60 percent.

The 1000-mile gas line from Comodoro Rivadavia to Buenos Aires was placed in operation December 16, 1949. The line, originally to be 1100 miles long, was shortened by blasting a tunnel through the Ventana Mountains and laying the pipe through the Laprida swamps instead of looping around these obstacles.

Refineries of Argentina

COMPANY	Location of Plant	Crude Charging Capacity (Bbls. Daily)	Cracking Capacity (Bbls. Daily)	Type of Refinery
Cía. Nativa de Petrólecs.	Campana	17,600	8,000	Complete
	Galvan	5,000	1,850	Skim-Crack
Diadema Argentina S.A. de Petroleo (B.P.M. Shell)	Dock Sud (Avellaneda)	13,800	8,000	Skim-Crack
Condor S A Petroleum Argentina	Lomas de Zamora (Buenos Aires) (Building)	1,000	None	Skim-Lube
Lottero Papini	Avellaneda (Buenos Aires)	950	None	Skim-Lube
Cía. "La Isaura" S.A.	Loma Paraguaya (Bahia Blanca)	1,900	None	Skimming
Standard Oil Co. S.A., Argentina	Manuel Elordi	1,100	None	Skimming
	Plaza Huincul	330	None	Skimming
Ultramar S. A. Petrolera, Argentina	Dock Sud (Buenos Aires)	5,000	2,850	Complete
Cía. General de Asfaltos	Wilde (Buenos Aires)	800	None	Skim-Lube
Cía Ferrocarrilera de Petróleo	Comodoro Rivadavia	6,300	2,000	Skim-Crack
S.A. Com é Ind "Ragor"	Quilmes (Buenos Aires)	500	None	Skim-Lube
Yacimientos Petrolíferos Fiscales	La Plata	71,000	24,200	Complete
	San Lorenzo	18,000	None	Comb Unit
	Lujan de Cuyo	3,800	1,000	Comb. Unit
	Chachapoyas	2,100	None	Comb. Unit
	Plaza Huincul	1,130	504	Skim-Crack
	Buenos Aires	28,000	.....	Comb. Unit Asphalt

Pipe Line of Argentina

AREA and COMPANY	Origin	Terminus	Length (Miles)	Diameter (Ins.)	Capacity of Line (Bbls. Daily)
CRUDE LINES:					
Gobernación Militar					
Comodoro Rivadavia:					
YPF	El Tordillo	El Trebol	3.7	8	15,725
	El Trébol	Escalante	6.8	8	18,870
	Escalante	Cañadón Perdido	8.9	8–10	22,000
	Cañadón Perdido	Kilómetro 9	5.8	7–8	
				9–10	28,300
	Cañadón Seco	Caleta Olivia	11	6	6,000
	Kilómetro 9	Caleta Córdova	6	8	25,160
	Kilómetro 9	Kilómetro 5	3.5	9–10	25,160
	Kilómetro 5	Kilómetro 3	2.3	8–10	25,160
	Campamento Sur	Kilómetro 3	2.7	5	6,290
	Manantiales Behr	C. Perdido	8.9	6–8	12,580
Astra	Field	C. Córdova	4.8	8	22,680
	Kilómetro 23	Field	9.3	6	12,580
Diadema	Kilómetro 27	Caleta Olivares	13.6	6	15,750
Ferrocarrilera	Manantiales Rcsales	Kilómetro 8	7.5	6	12,580
	Kilómetro 8	C Córdova	4.7	8	12,580
	Kilómetro 8	Kilómetro 3	3 7	6	12,580
	Mina Solano	Kilómetro 8	18.6	6	12,580
Neuquén:					
YPF	Field	Est. Challacó	3.9	4–6	9,400
Standard Oil Co	Huincul	Dadín	7	3–6	2,000
	Dadín	Chellacó	9	3–4	4,800
Mendoza:					
YPF	Tupungato	Est. Anchoris	10.4	8	18,870
	Barrancas	Agrelo	9.3	3–4	3,100
Salta:					
YPF	Río Pescado	Oran	16.8	4	3,775
	Tranquitas	Vespucio	3.7	3	1,885
Standard Oil Co	Agua Blanca	Elordi	41.5	3	1,195
	San Pedro	Lomitas	16.3	4	3,900
	Lomitas	Vespucio	3.8	4	5,150
	Vespucio	Hickman	46	4–5–6	5,000
	Hickman	Elordi	37	4	2,500
	Ramos	Aguay	19	1½	240
NATURAL GAS LINES:					
Gobernación Militar					
Comodoro Rivadavia:					
Dirección General del Gas del Estado	Comodoro Rivadavia	Buenos Aires	1000	10	35 Mmcf
	Tupungato	Mendoza	37.2	3–4	.....
	La Plata	Buenos Aires	37.2	6	.....
	Kilómetro 27 (Building)	Kilómetro 12	16	10	5 Mmcf
	Cañadon Seco (Building)	Kilómetro 12	65	10	n.a.

n.a.—Not available.

BOLIVIA

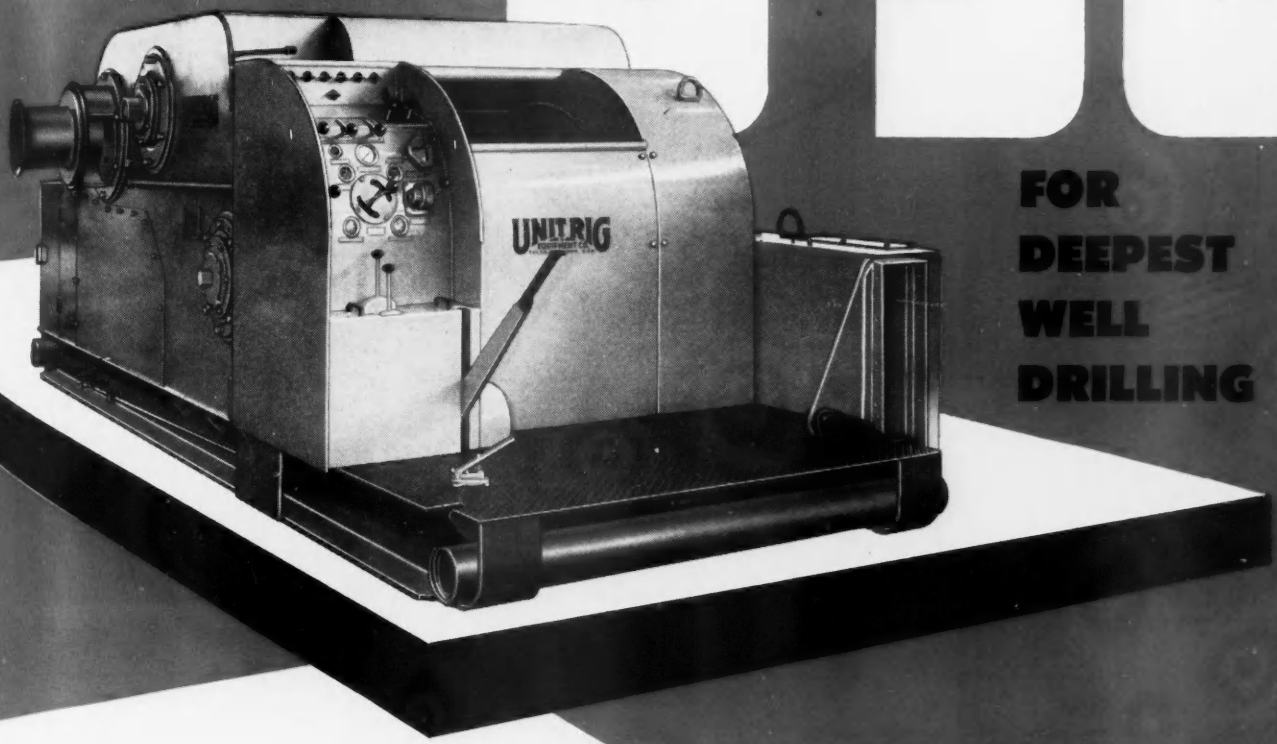
BOLIVIA substantially increased its oil production during 1949, producing 678,257 barrels during the year. This constituted a daily average of 1858 barrels compared with 1266 barrels in 1948 and 1033 barrels in 1947. The enlarged output was due to greater production in the Camiri field, which was made possible by completion of a pipe line from the field to Sucre and Cochabamba. Increased output of Camiri more than offset decreases in production of Bermejo and Sanandita, the only two other Bolivian fields currently being produced.

Bolivia Oil Production, Producing Wells and Geological Data

DEPARTMENT and FIELD	Year of Discovery	PRODUCING OIL WELLS END OF 1949				CRUDE OIL PRODUCTION (Barrels)			ENGINEERING AND GEOLOGICAL DATA					DEPTH (Ft.)		
		Flowing	Art. Lift	Total	Daily End of 1949	Year 1948	Year 1949	Cumulative Through 1949	Est. Proven Area (Acres)	Gravity Oil (API)	Name	Kind	Age	Min. to Top of Pay	Mav. to Bottom of Pay	Type of Structure
CHUQUISACA:																
Buena Vista*	....	..	..	..	....	.....	Inactive	.....	1,475	43.5	.....	Sand	Devonian	....	3165	Elongated dome
Caigua*	....	..	..	..	....	.....	Inactive	.....	....	....	.....	.....	.....	....	....	Anticline
Camatindi*	1928	..	..	..	....	.....	Inactive	11,876	1,120	41.5	.....	Sand	Devonian	2350	4300	Fltd. Anticline
SANTA CRUZ:																
Camiri	1927	10	2	12	1,411	267,438	516,296	2,350,386	640	53.1	Iquiri	Sand	Devonian	....	3200	Anticline
Guairuy*	....	..	..	..	....	.....	Inactive	.....	....	57.8	Guairuy	Sand	Devonian	1731	....	Anticline
Saipuru*	....	..	..	..	....	.....	Inactive	.....	740	40	.....	Sand	Devonian	500	....	Anticline
TARIJA:																
Bermejo	1927	2	4	6	219	107,301	80,021	940,095	600	25.7	Tarija	Sand	Permi Triassic	2214	3600	Anticline
Sanandita	1926	..	9	9	224	88,821	81,940	1,699,602	200	41.5	Totora	Sand	Permi Triassic	200	2100	Anticline
Total	....	12	15	27	1,854	463,560	678,257	5,001,959	4,775	....	.....	.....	.....	....	....	.....

* Inactive fields.

Smooth POWER... U-30



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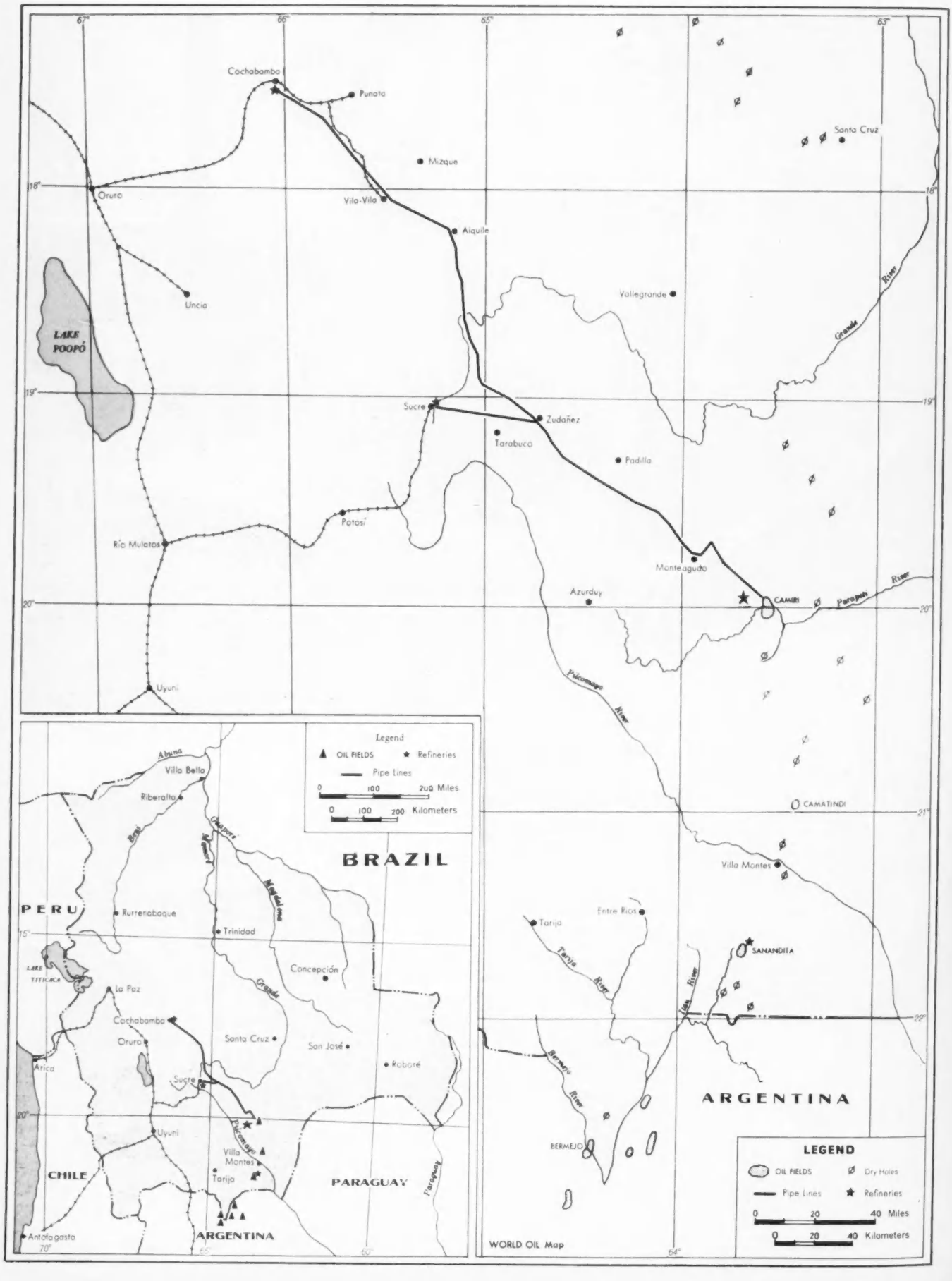
BOLIVIA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Santa Cruz
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Sucre
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CAMIRI
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Pilcomayo River
Uyuni
CAMATINDI
Villa Montes
Tarija
Entre Ríos
SANANDITA
Tarija River
Lias River
Bermejo River
BERMEJO
ARGENTINA
Legend
OIL FIELDS
Refineries
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0 100 200 Kilometers
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PARAGUAY
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Antofagasta
ARGENTINA
70°
65°
60°
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Dry Holes
Pipe Lines
Refineries
0 20 40 Miles
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WORLD OIL Map
64°

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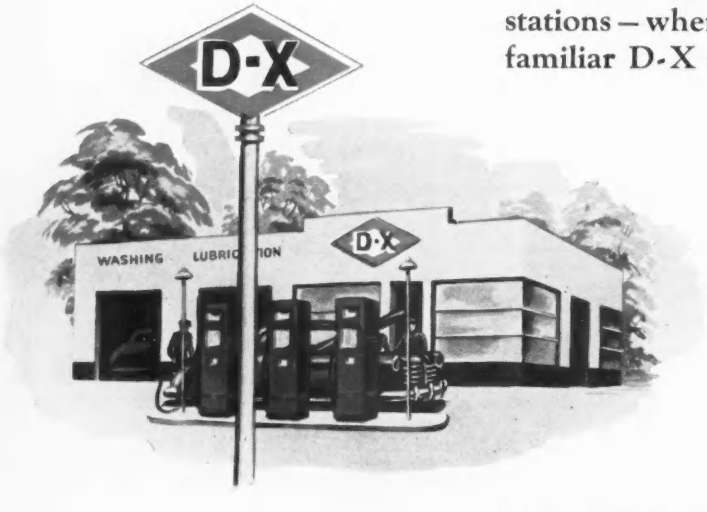

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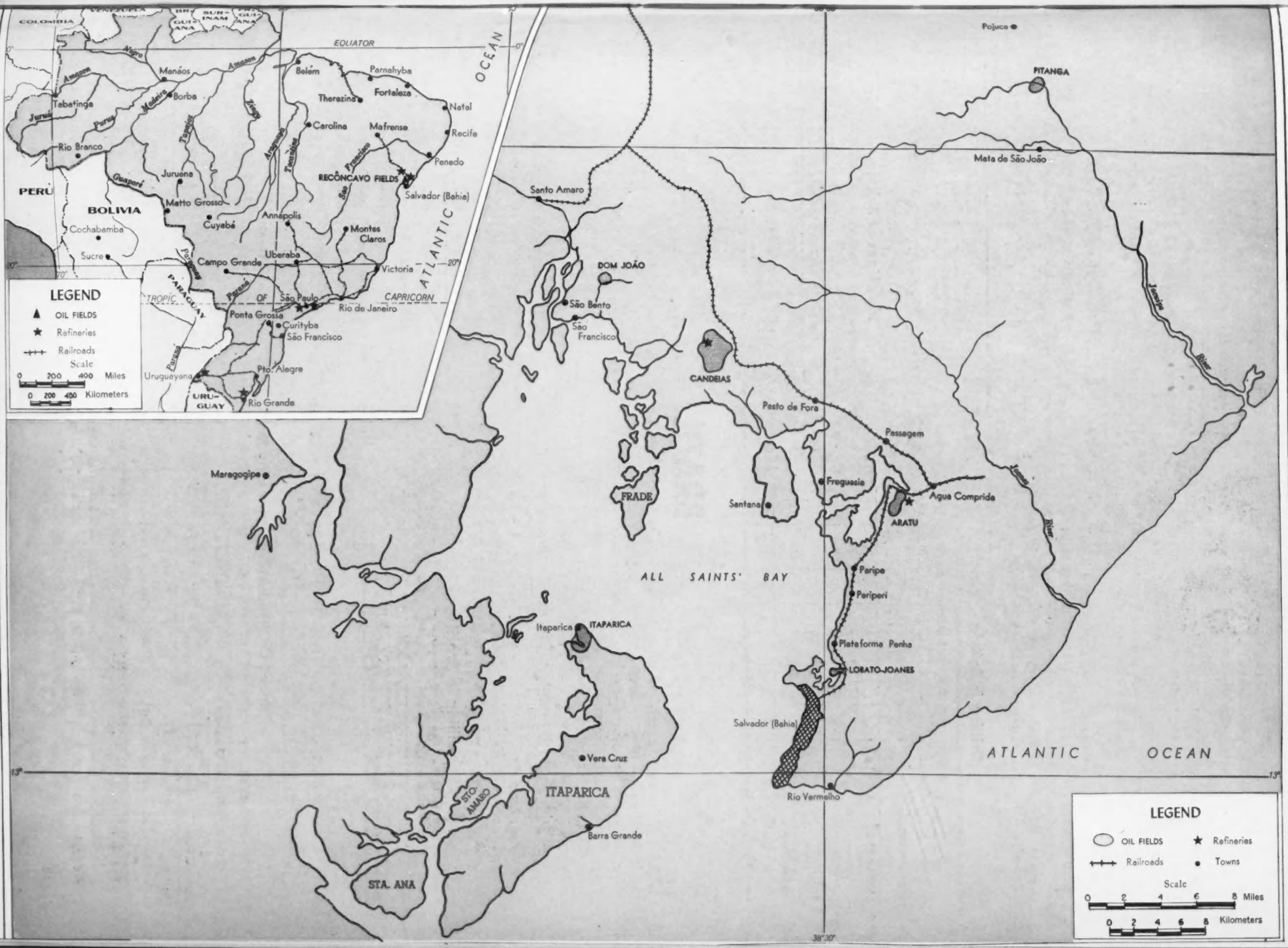
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PITANGA
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Santo Amaro
DOM JOÃO
São Bento
São Francisco
CANDEIAS
Jequitinhonha River
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ITAPARICA
Barra Grande
STA. ANA
Rio Vermelho
13°
38°30'
LEGEND
OIL FIELDS
Refineries
Railroads
Towns
Scale
0 2 4 6 8 Miles
0 2 4 6 8 Kilometers

BOLIVIA—Continued

The Camiri field now has a potential of three times its present output but the field is still held to the capacity of the local refinery which handles 84 percent of the production and the remainder goes to the Sucre refinery via the new pipe line from Camieri to Cochabamba 350 miles north. The two refineries now have a combined capacity of 4000 barrels a day, but this will be enlarged and production will probably increase accordingly in the coming year. Consumer demand has much to do with holding down production at Camiri as well as the other fields.

The 5000-barrel a day refinery at Cochabamba is still under construction, but when it is finished distribution of products to the northern uplands will take up the slack in present demand. The 900 barrels refinery at Sanandita is capable of handling the present requirements in that area.

Wildcat drilling during the year centered around the Busch (Mandeyapecua) area, with one well completed at 3996 feet with no oil shows and one drilling at the end of the year. Another well drilling at Los Monos had encountered traces of gas and oil at 1660 feet and it is planned to take it to 3600 feet. Topographic and geological surveying is now being carried on in an area 62 miles northeast of the Camiri field with deep exploratory drilling slated to commence in the area later in 1950.

Drilling in Bolivia

DEPARTMENT and FIELD	WELLS COMPLETED IN 1948				WELLS COMPLETED IN 1949				Wells Drilling End of 1949
			TOTAL				TOTAL		
	Oil	Dry	Wells	Footage	Oil	Dry	Wells	Footage	
SANTA CRUZ:									
Camiri	4	1	5	13,796	2	...	2	5,466	2
Guairuy	...	...	....	.....	...	1	1	2,443	..
Busch	...	...	....	.....	...	1	1	3,996	1
TARIJA:									
Bermejo	...	1	1	1,187	...	...	...	.....	1
Sanandita	...	...	....	.....	1	...	1	2,351	..
Los Monos	...	...	....	.....	...	...	....	.....	1
Total	4	2	6	14,983	3	2	5	14,256	5

Refineries of Bolivia

COMPANY	Location of Plant	Crude Charging Capacity (Bbls. Daily)	Crude Runs End of 1949 (Bbls. Daily)	Type of Refinery
Yacimientos Petroliferos Fiscales Bolivianos (Y.P.F.B.)..	Camiri	1,447	1,201	Skimming
	Cochabamba	5,000	....	Building
	Sanandita	944	208	Skimming
	Sucre	3,000	270	Skimming

Pipe Lines of Bolivia

COMPANY	Origin	Terminus	Length (Miles)	Diameter (Inches)	Capacity (Bbls. Daily)	Year Completed
Yacimientos Petroliferos Fiscales Bolivianos (Y.P.F.B.)...	Camiri	Cochabamba	327	6	6,000	1949
Y.P.F.B. (Spur).....	Tapirani	Sucre	44	4	....	1948

BRAZIL

BRAZIL'S annual production dropped 34,328 barrels from the 1948 figure to 109,075 barrels for 1949. All producing fields are in the Bahia area. No new production was found during the year and proven fields had their production curtailed because of lack of refinery facilities.

The proven area of the Dom Joao field was increased about 520 acres during 1949 with five successful wells.

Three wildcats were drilled during the year in the All Saints' Bay area by Conselho Nacional do Petroleo, the government petroleum council. Two of them, Pindoba 1 and Macaco 1, were dry holes at 1628 feet and 1861 feet, respectively. A successful gas well was completed in Restinga 1 at 2921 feet.

With 17 wells completed in 1949 as compared with 15 in 1948, total footage drilled amounted to 48,010 feet compared with 38,438 feet in 1948.

Drilling in Brazil

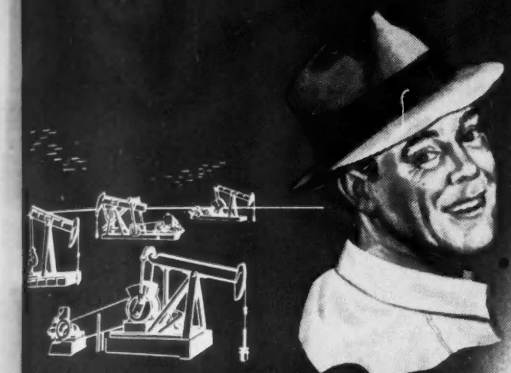
State and Field	Wells Completed in 1948					Wells Completed in 1949					Wells Drilling End of 1949
				Total					Total		
	Oil	Gas	Dry	Wells	Footage	Oil	Gas	Dry	Wells	Footage	
BAHIA:											
Candeias	8	..	1	9	32,083	8	..	1	9	33,700	2
Dom João	6	..	..	6	6,355	5	..	..	5	7,900	3
Wildcats	..	..	..	..	.....	..	1	2	3	6,410	..
Total	14	..	1	15	38,438	13	1	3	17	48,010	5

Refineries of Brazil

Company	Location of Plant	Crude Charging Capacity (Bbls.) Daily)	Type of Refinery	Operating Status
Conselho Nacional do Petroleo	Bahia	2,500	Cracking	Building
	Bahia	150	Skimming	Operating
Distilaria Rio Grandense	Rio Grande do Sul	500	.....	.....
Industria Matarazzo de Energia S. A.	São Paulo	1,000	Skimming	Operating
Ipiranga S. A. Ind. Brasileira de Petroleo	Rio Grande do Sul	1,000	Skimming	Operating
Refinaria e Exploração de Petroleo União S. A.	São Paulo	20,000	Cracking	Planned
Refinaria de Petroleo Districto Federal S. A.	Districto Federal	10,000	Cracking	Planned
Refinaria Nacional de Petroleo	Santos-São Paulo	45,000	Cracking	Planned

Brazil Oil Production, Producing Wells, and Geological Data

State and Field	Year of Discovery	Producing Wells End of 1949			Crude Oil Production—(Barrels)				Proved Area (Acres)	Gravity Oil (API)	Name	Kind	Age	Depth (Feet)		Avge. Thickness of Pay (Feet)	Type of Structure
		Flowing	Art. Lift	Total	Daily End of 1949	Year 1948	Year 1949	Cumulative Through 1949						Min. to Top of Pay	Max. to Bottom of Pay		
BAHIA:																	
Aratu	1942	..	2	2	8	2,986	1,567	56,147	74	42	Santo Amaro	Sand	Cret.	1312	1968	66	Anticline
Candeias	1941	11	41	52	350	126,601	97,589	441,673	1038	26	Santo Amaro	Sand	Cret.	2461	3937	33	Anticline
Dom João	1947	..	14	14	30	8,342	6,467	16,882	620	39	Santo Amaro, Sergi	Sand	Cret.	886	1313	131	Anticline
Itaparica	1942	6	10	16	...	.....	.....	52,421	148	30	Santo Amaro, Sergi	Sand	Cret	1968	2461	33	Anticline
Lobato-Joanes	1939	..	2	2	12	5,474	3,452	71,466	30	35	Santo Amaro	Sand	Cret.	1312	1706	82	Faults
Pitanga	1945	..	1	1	...	.....	.....	401	....	26	Santo Amaro	Sand	Cret.	4865	....	8	Anticline
Total	....	17	70	87	400	143,403	109,075	638,990	....	..	.....	....	.....	....	....	..	.....



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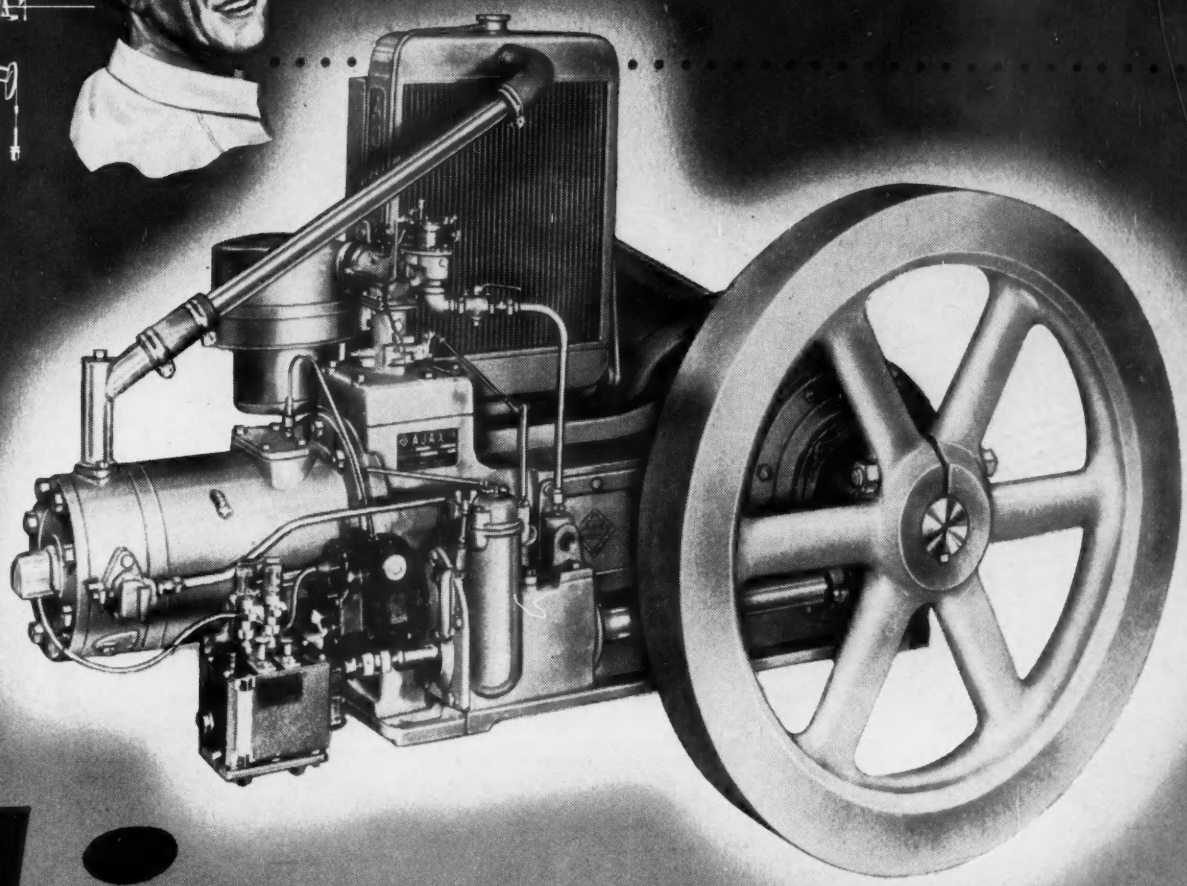

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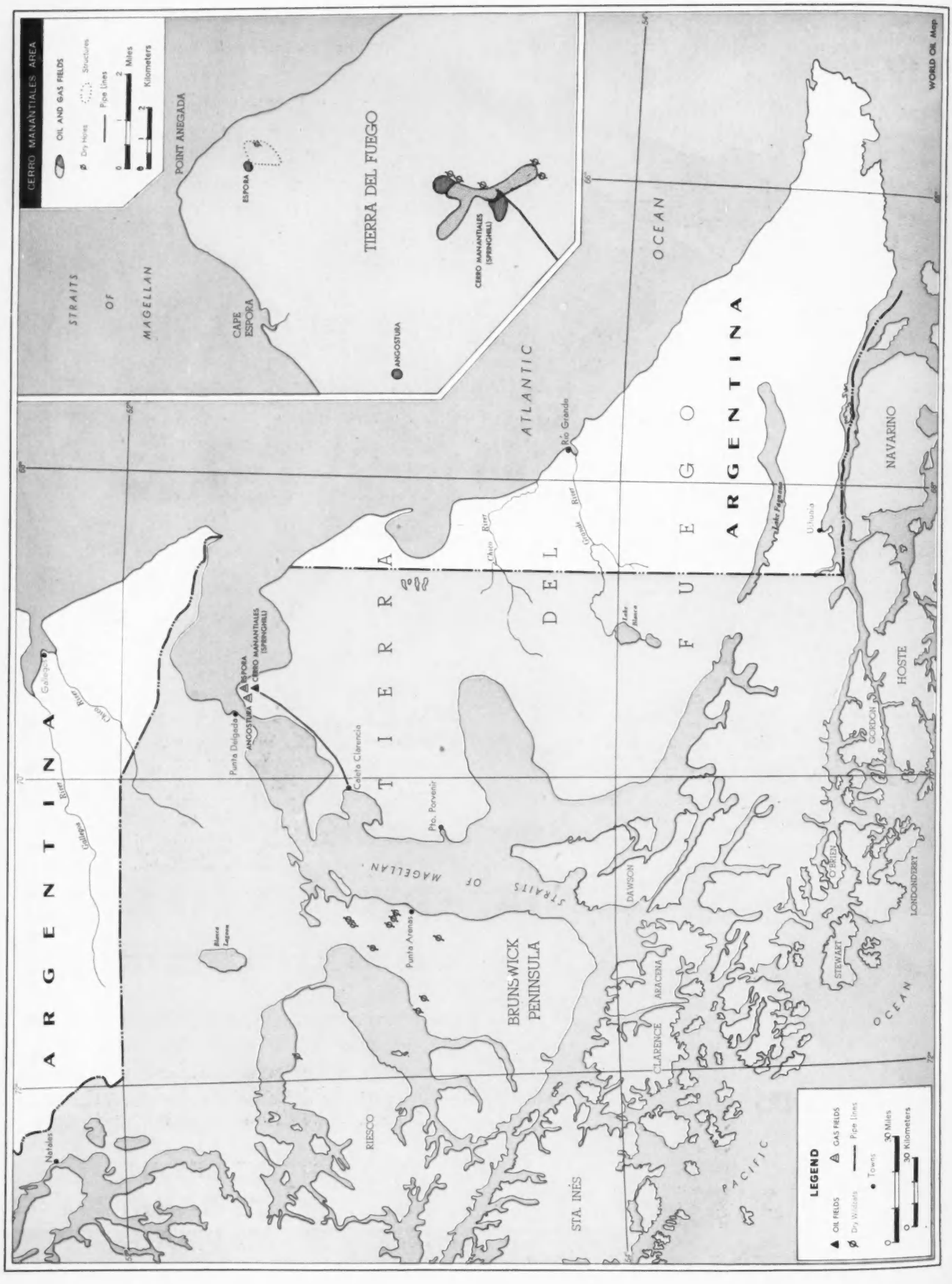
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HOSTE
GORDON
Punta Delgada
Caleta Clarencia
Pto. Porvenir
Punta Arenas
Blanca Lagoon
Gallegos River
Chico River
Lake Blanco
STRAITS OF MAGELLAN
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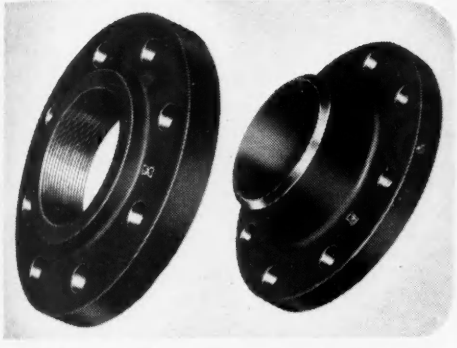

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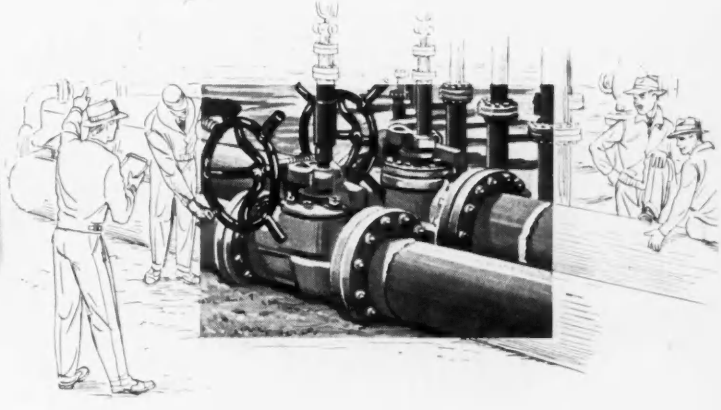

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97 YEARS IN PENNSYLVANIA'S CAPITAL

CHILE

CHILE'S Cerro Manatiales (Springhill) field was further expanded in 1949 with the completion of five oil wells and one gas well. During the year five dry holes were drilled in the field also and the total number of producing wells stood at 14 at the end of the year. The seven gas wells now completed in the field are shut in because of lack of an outlet or local need. Production from the field during 1949 was 55,280 barrels of oil, which is also the cumulative figure because the field did not have an outlet before this year.

A 42.5-mile, eight-inch pipe line was completed from Cerro Manantiales to a storage terminal at Calete Clarencia on Gente Grande Bay on the Straits of Magellan. The storage terminal has a capacity of 270,000 barrels and the outlet is a 4300-foot, 16-inch submarine loading line.

The world's southernmost oil field now produces at a rate of about 2000 barrels a day and first shipments of crude were made in February, 1950, to the ANCAP refinery at Montevideo, Uruguay. The Chilean Corporacion de Fomento signed a contract with ANCAP to deliver 1,130,000 barrels of crude over an 18-month period. The first shipment climaxed more than four years of development work in the field and was a matter of great significance to Chile.

Two drilling rigs are operating in the Cerro Manantiales field proper; another rig completed Angostura 1 as a gas well at the end of the year; and the fourth rig was drilling the Cerro Sombrero structure about ten miles southeast of Cerro Manantiales. A wildcat, Espora 2, five miles north of Cerro Manantiales and about the same distance east of Angostura 1, was completed as a gas well at 7312 feet in June, 1949.

Corporacion de Fomento's plans for 1950 call for 15 development wells in the Cerro Manantiales field and at least three wildcats, not counting the one drilling at Cerro Sombrero. Estimated production for 1950 is 750,000 barrels. Long-term plans of the governmental agency call for a refinery near the present storage terminal.

Chile has recently indicated she prefers to import sterling oil for her domestic needs, until she becomes self-sufficient in oil, and save scarce dollars for purchase of U. S. machinery. Because of the estimated reserves in the Cerro Manantiales field of about 30 million barrels, the country hopes to be free of imports as soon as the field is fully developed. Chile wants to export enough crude to dollar areas to offset imports until she is self-sufficient and has recently started negotiations for the purchase of a 13,600-ton oil tanker for that purpose.

Salient Data on Cerro Manantiales Field

Operating Company		Corporacion de Fomento
Year of Discovery		1945
Producing Wells End of 1949	Oil	14
	Gas	None (7 shut in)
Wells Completed in 1949	Oil	5
	Gas	1
	Dry	5
	Total	11
Field Wells Drilling End of 1949		1
Footage Drilled During 1949		82,965 feet
Production in 1949		55,280 barrels
Cumulative Production to End of 1949		55,280 barrels
Daily Production at End of 1949		2,000 barrels
Estimated Proved Area of Field		700 acres
Gravity of Oil (A.P.I.)		39-42
Producing Formation—Local Name		Springhill
Kind		Sand
Age		Cretaceous
Minimum Depth to Top of Pay		7350 feet
Maximum Depth to Bottom of Pay		7550 feet
Average Thickness of Pay		65 feet
Type of Structure		Anticline

COLOMBIA

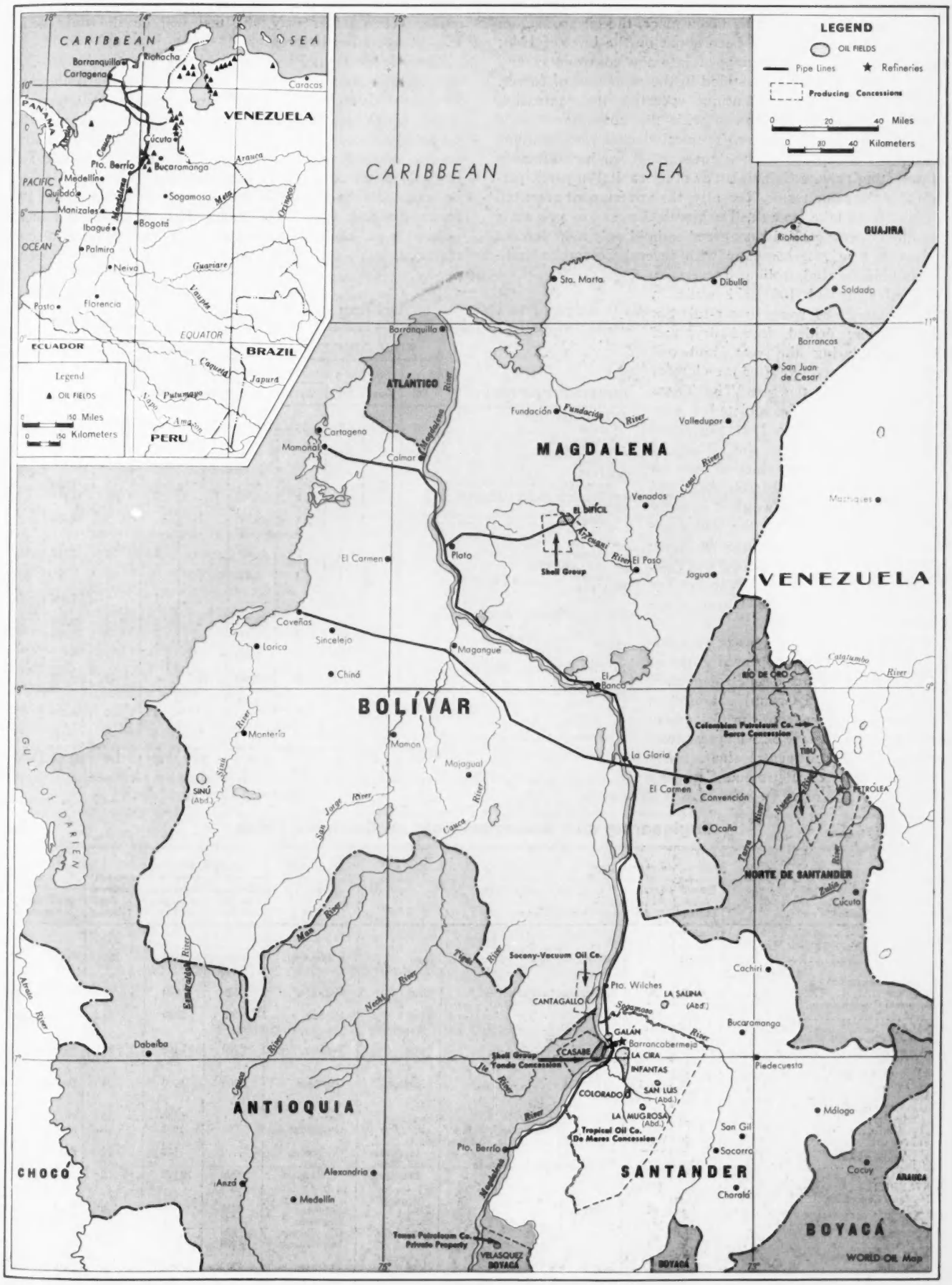
COLOMBIA reached an all-time high in 1949 with an output of 29,643,979 barrels of crude. This figure does not include the De Mares condensate and is more than 4 million barrels above the previous highest year, 1940. Much of this increase is due to a rather peaceful year in labor relations and an increase of 57 percent in the number of new oil wells completed as compared with 1948.

Tropical Oil Company, the principal oil producer in Colombia, has begun retrenchment of forces preparatory to turning over its concession to the government in August, 1951.

Oil Production and Producing Wells in Colombia Fields

DEPARTMENT CONCESSION and FIELD	Operating Company	Year of Discovery	PRODUCING OIL WELLS END OF 1949			CRUDE OIL PRODUCTION—(Barrels)			
			Flowing	Art. Lift	Total	Daily End of 1949	Year 1948	Year 1949	Cumulative Through 1949
ANTIOQUIA:									
Yondó Concession:									
Casabe	Shell Group	1941	12	55	67	17,076	5,671,715	6,226,727	21,522,100
BOLIVAR:									
Cantagallo Concession:									
Cantagallo	Socony-Vacuum Oil Company	1943	3	....	3	1,178	389,509	337,092	742,397
BOYACA:									
Teran Guaguaqui:									
Velásquez	Texas Petroleum Co. fee	1946	3	....	3	976	.....	239,352	239,352
MAGDALENA:									
El Difícil Concession:									
El Difícil	Shell Group	1943	10	....	10	3,453	583,896	1,523,519	2,107,415
NORTE DE SANTANDER:									
Barco Concession:									
Carbonera	Colombian Petroleum Co.	1939	89	31	120	25,103	8,003,215	9,460,866	53,974,100
La Petrólea		1933							
Rió de Oro		1920							
Tibú		1940							
SANTANDER:									
De Mares Concession:									
Colorado	Trópical Oil Company	1945	6	984	990	34,985	9,094,225	11,856,423	387,515,005
Galán		1945							
Infantas		1916							
La Cira		1926							
Las Monas Concession:									
La Salina	Socony-Vacuum Oil Company	1926	....	....	....	.....	.....	.....	75,000
Total	.....	....	123	1,070	1,193	82,771	23,742,560	29,643,979	466,175,369

COLOMBIA


LEGEND
OIL FIELDS
Pipe Lines
Refineries
Producing Concessions
0 20 40 Miles
0 20 40 Kilometers
CARIBBEAN SEA
VENEZUELA
ECUADOR
PERU
BRAZIL
PACIFIC OCEAN
EQUATOR
Legend
OIL FIELDS
150 Miles
150 Kilometers
Barranquilla
Cartagena
Riohacha
Caracas
Cúcuta
Pto. Barrio
Bucaramanga
Medellín
Quibdó
Manizales
Sogamosa
Bogotá
Ibagué
Palmira
Neiva
Pasto
Florencia
Arauca
Meta
Guaviare
Vaupés
Caquetá
Japurá
Putumayo
Amazon
GUAJIRA
Riohacha
Sta. Marta
Dibulla
Soldado
Barrancas
San Juan de Cesar
Valledupar
Fundación
Fundación River
ATLÁNTICO
Barranquilla
Magdalena River
Cartagena
Mamonal
Calmar
MAGDALENA
Venados
Cesar River
Machiques
El Difícil
Arrecuazi River
El Paso
Shell Group
El Carmen
Plato
Jagua
VENEZUELA
Coveñas
Sincelejo
Lorica
Chinú
Magangué
El Banco
Catatumbo River
RÍO DE ORO
BOLÍVAR
Montería
Mamon
Majagual
Sinú River
SINÚ (Abd.)
GULF OF DARIEN
San Jorge River
Cauca River
La Gloria
Colombian Petroleum Co. Barco Concession
TIBÚ
El Carmen
Convención
PETRÓLEA
Ocaña
Nuevo River
Tarra River
NORTE DE SANTANDER
Zulia River
Cúcuta
Cachiri
Socony-Vacuum Oil Co.
Pto. Wilches
CANTAGALLO
LA SALINA (Abd.)
Sogamoso River
Bucaramanga
GALÁN
Barrancabermeja
CASABE
Shell Group Tenden Concession
LA CIRA
INFANTAS
Piedecuesta
Dabeiba
Sinú River
Nechi River
Tigre River
Cauca River
Ité River
COLORADO
SAN LUIS (Abd.)
LA MUGROSA (Abd.)
Tropical Oil Co. De Mares Concession
ANTIOQUIA
Pto. Berrío
Magdalena River
San Gil
Málaga
Socorro
Cocuy
ARAUCA
CHOCÓ
Alexandria
Anzá
Medellín
SANTANDER
Charalá
Tenes Petroleum Co. Private Property
VELASQUEZ BOYACÁ
BOYACÁ
BOYACÁ
WORLD OIL Map

COLOMBIA—Continued

As a result of laying off about 450 workers in the De Mares Concession last year, the company was temporarily faced with a strike threat. Had this taken place, the oil production for the country would have been about on the level of 1948; however, the government stepped into the controversy and agreed that Tropical was justified in the reduction of forces.

Tropical was asked to continue operating the concession after its 30-year lease expires, with the government as a major share-holding partner. Tropical declined to continue under those conditions and the government has had difficulty in interesting private Colombian or other capital in participating under the same terms. Recently, the government admitted its inability to take over the De Mares Concession as a state controlled operation and has agreed to hold only a 45 percent interest in a private company with several Colombian individuals holding a controlling interest.

Colombia drilled 106 field wells in 1949, of which 80 were successful. Six wildcats were drilled, found dry, and abandoned during the year, and one wildcat was completed after the close of the year. Late in the year The Texas Petroleum Company completed a successful wildcat, Tetuan 1, in the upper Magdalena Valley near the village of Ortega. Preliminary production tests on the well indicated 800 barrels daily and if the well proves to be as good as early tests indicated, it will be the first commercial wildcat success since the same company brought in Velasquez 1 in 1946. At any rate, it will encourage further exploratory work in the Upper Magdalena.

Further encouraging signs of stepped-up exploratory work appeared early in 1949 when Compania de Petroleo Shell de Colombia (Shell Group) obtained an offshore concession from the Colombian government to explore 52,500 acres along the Caribbean continental shelf. Early this year The Texas Petroleum Company also entered the Caribbean coast play in Colombia when it prepared to start a test well about 12 miles east of Barranquilla. When under way, the test will be the only active wildcat operation in progress.

The Rio de Oro, River of Gold, field in the Barco Concession will soon be opened for production by Colombian Petroleum Company. The field, discovered in 1920, has produced 66,149 barrels of oil from its nine wells in the past but no outlet existed for the oil and the field has been shut down several years. A pipe line will soon be completed to the Tibu field, 24 miles south, and production from Rio de Oro can be resumed. The nine wells are all producing from about 1900 feet and a deep Cretaceous test is slated for this year in the general area. Development of the shallow zone will also be resumed.

Drilling in Colombia

DEPARTMENT and FIELD	WELLS COMPLETED IN 1948					WELLS COMPLETED IN 1949				Wells Drilling End of 1949
				Total				Total		
	Oil	Gas	Dry	Wells	Footage	Producing	Dry	Wells	Footage	
ANTIOQUIA:										
Casabe	18	..	2	20	116,896	44	1	45	221,457	17
Wildcats	..	..	..	..	.....	..	2	2	6,883	..
ATLANTICO:										
Wildcats	..	..	..	..	.....	..	1	1	11,695	..
BOLIVAR:										
Cantagallo	..	..	..	..	.....	..	1	1	7,290	..
Wildcats	..	1	4	5	31,356	..	2	2	16,598	..
BOYACA:										
Velásquez	..	..	2	2	16,823	1	..	1	8,306	..
Wildcats	..	..	1	1	6,738	..	..	....	.....	..
CAQUETA:										
Wildcats	..	..	3	3	14,591	..	1	1	5,553	..
CUNDINAMARCA:										
Wildcats	..	..	1	1	1,317	..	..	....	.....	..
GUAJIRA:										
Wildcats	..	..	..	..	.....	..	1	1	7,814	..
MAGDALENA:										
El Difícil	6	..	..	6	44,678	2	2	4	23,390	..
Wildcats	..	..	3	3	12,325	..	3	3	21,917	..
META:										
Wildcats	..	..	2	2	3,753	..	..	....	.....	..
NORTE DE SANTANDER:										
Barco Fields	27	..	1	28	162,336	33	9	42	208,851	..
SANTANDER:										
La Salina	..	..	1	1	3,020	..	..	....	.....	..
Wildcats	..	..	..	..	.....	..	1	1	9,200	..
TOLIMA:										
Wildcats	..	..	..	..	.....	..	2	2	9,018	..
Total	51	1	20	72	413,833	80	26	106	557,972	17

Engineering and Geological Data on Colombia Fields

Department, Concession and Field	Proved Area (Acres)	Range of Gravity Oil (API)	Name	Kind	Age	DEPTH, (Feet)		Average Thickness of Pay (Feet)	Type of Structure
						Minimum to Top of Pay	Maximum to Bottom of Pay		
ANTIOQUIA									
Yondó Concession									
Casabe	5,000	20.8	La Cira, Colorado	Sand	L. Mio-Olig.	2100	3900	300	Faulted Anticline
BOLIVAR									
Cantagallo Concession									
Cantagallo	550	20	Esmeraldas, La Paz	Sand	Olig.-Eoc.	6006	6400	160	Faulted Anticline
Floresanto Concession									
Sinú	250	50	Pajuil	Sand	Miocene	650	2300	37.5	Faulted Anticline
BOYACA									
Terán-Guaguaquí (Freehold)									
Velasquez	400	25		Sand	Tertiary	6700	8455	85	Anticline
MAGDALENA									
El Difícil Concession									
El Difícil	2,500	40.1	El Difícil	Limestone	Oligocene	5200	5900	28	Faulted Anticline
NORTE DE SANTANDER									
Barco Concession									
Carbonera	500	21	Cuervos Barco	Sand	Eocene	....	3359	10	Faulted Anticline
Petrólea	4,200	45	La Luna, Ostea, Zones 1, 2, 3, 4	Limestone	Cretaceous	99	1953	33	Anticline
Río de Oro	420	39	Catatumbo, Río de Oro, Uribante	Shale, Sand, Limestone	Cretaceous	....	1865	21	Faulted Anticline
Tibú	8,000	31	Barco, Catatumbo, Uribante	Sand, Shale, Limestone	Tertiary, Cretaceous	4300	10,876	100	Anticline
SANTANDER									
De Mares Concession									
Colorado	270	37.6	Colorado	Sand	Eocene	3400	4200	200	Faulted Anticline
Galán	426	19.5	Zone A	Sand	Oligocene	3900	4050	125	Faulted Anticline
Infantas	5,750	26.3	Zones A, B, C	Sand	Olig.-Eocene	300	2600	390	Faulted Anticline
La Cira	12,265	24.5	Zones A, B, C	Sand	Olig.-Eocene	200	4300	382	Faulted Anticline
Las Monas Concession									
La Salina	400	21	Lisama	Sand	Eocene	1770	4378	20	Faulted Anticline

ECUADOR

ECUADOR'S production in 1949 was almost the same as the previous year's, with about 2.6 million barrels reported. The completion of 67 field wells last year as compared with 60 in 1948 accounts for the 4332-barrel increase. Development of the existing fields continues but the work just balances the normal decline in production. This static condition will not continue as all the present fields are practically drilled up. The only factor that prevented a drop in production in 1949 was the shallow production found in 1948 in the Ancon field. This shallow zone is now almost completely developed and Ecuador is faced with the problem of finding new sources of oil or suffer a decline in the present output.

A group of independent Texas oil men have formed the Manabi Exploration Company, Inc., for exploration work on 2 million acres of leased land along the Ecuadorean coast above Quayaquil. Their activities now consist of surface work carried on by a gravity, geological and two soil-analysis parties. The coastal area where they are operating consists largely of Tertiary marine deposits favorable to oil accumulation. Actual drilling operations are planned for the dry season this summer.

The Ecuador government has been a little more liberal in granting oil concessions to outside interests than some of the neighboring countries. Late in 1948 the government granted a 12 million acre concession to a company formed jointly by Shell Oil Company and Esso Standard Oil Company, S. A. Equally shared by the companies, the concession lies east of the Ecuadorean Andes in the Oriente region. The exploration period in the grant was for five years, with a possible extension of three years. The exploitation period covered 40 years with a guaranteed extension of ten more years. The grant was to be held on an annual rental basis with the amount decreasing after the first five years. Royalties were to be paid the government, for any oil found on a sliding scale depending on the distance of the production from an embarkation point on the coast. Other lease conditions were relatively liberal and the operation was expected to put Ecuador on the map as an oil producing country. The dense jungle areas of the Oriente make operations there both difficult and costly but this detriment did not stop the larger companies from operating in the region. Shell has, however, indicated that if the results of two wells being drilled at Villano and Macuma are negative the company will withdraw from the concession and the country.

Drilling in Ecuador

PROVINCE and FIELD	WELLS COMPLETED IN 1948				WELLS COMPLETED IN 1949			
	Oil	Dry	TOTAL Wells	TOTAL Footage	Oil	TOTAL Wells	TOTAL Footage
GUAYAS:							
Ancón	31	..	31	47,411	47	47	76,360
Carolina-Santa Paula	7	..	7	4,444	4	4	5,965
Concepción	5	1	6	4,526	4	4	2,078
El Tigre El Cautivo	5	6	11	25,020	9	9	39,650
Petrópolis	5	..	5	5,290	3	3	10,934
Wildcats	..	3	3	18,493	..	..	.....
Total	53	10	63	105,184	67	67	134,987

Oil Production and Producing Wells in Ecuador

PROVINCE and FIELD	Operating Company	Year of Discovery	Total Producing Wells End of 1949	Daily at End of 1949	Year 1948	Year 1949	Cumulative Through 1949
GUAYAS:							
Ancón*	Anglo-Ecuadorian Oilfields, Ltd.	1921	752	5,079	1,724,340	1,853,883	40,093,609
Carolina-Santa Paula	Carolina Oil Company	....	9	167	84,841	60,997	1,190,294
Concepción	Concepción Ecuadorian Oilfields, Ltd	1931	28	218	91,912	79,520	913,409
Petrópolis	Petrópolis Oil Comapny	1937	5	289	59,427	105,614	853,357
El Tigre El Cautivo	Ecuadorian Oilfields, Ltd	1928 1920	14	1,411	650,199	515,037	4,980,348
Total		....	808	7,164	2,610,719	2,615,051	48,031,047

* Ancón also produced 3,858,604 thousand cubic feet of gas in 1949.

Refineries of Ecuador

COMPANY	Location of Plant	Crude Charging Capacity (Bbls. Daily)	Cracking Capacity (Bbls. Daily)	Type of Refinery
Anglo-Ecuadorian Oilfields, Ltd	La Libertad (100 mi w. Guayaquil)	5,200	None	Skimming (One lb. oil cut)
Ecuador Oilfields, Ltd	Cautivo (Guayas, 90 mi from Guayaquil)	582	None	Skimming

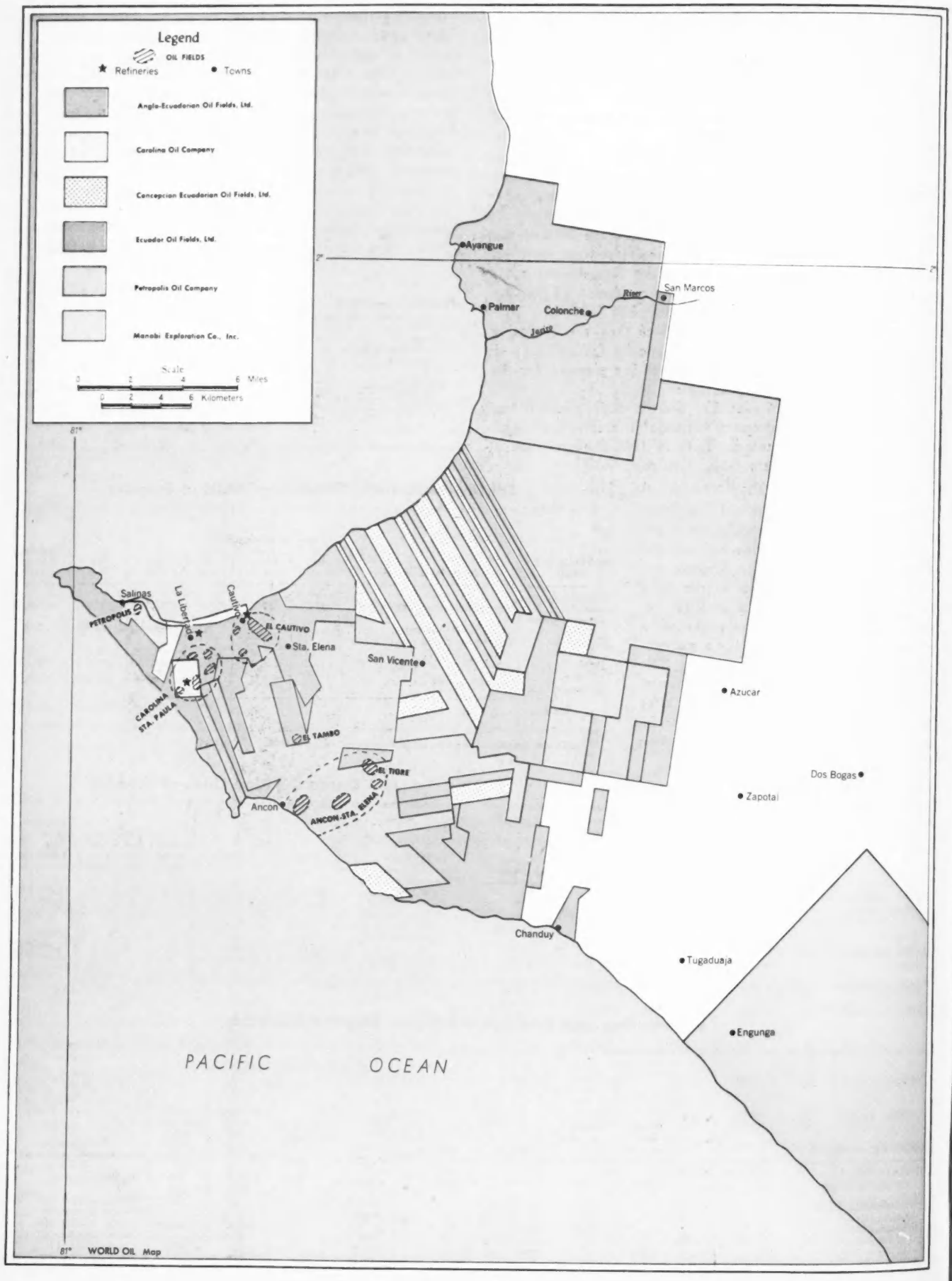
Crude Oil Pipe Lines of Ecuador

COMPANY	Origin	Terminus	Length (Miles)	Diameter (In.)	No. of Pump Stations	Capacity of Line (Bbls. Daily)	Year Completed
Anglo-Ecuadorian Oilfields, Ltd	Ancón	La Libertad	8	6	1	12,960	1925
Carolina Oil Co.	Santa Paula	Carolina	3	4	2	2,400	....
Ecuador Oilfields, Ltd (British Controlled Oilfields, Ltd.)	Tigre	Cautivo	11	4	1	2,500	1940
Petrópolis Oil Co.	Salinas	Libertad	8	4	1	3,600	1940

Engineering and Geological Data on Ecuador Oil Fields

PROVINCE and FIELD	Proved Area (Acres)	Gravity of Oil (API)	PRODUCING FORMATION Name	Kind	Age	DEPTH (Feet) Minimum to Top of Pay	DEPTH (Feet) Maximum Total Depth of Wells	Average Thickness of Pay (Feet)	Type Structure
GUAYAS:									
Ancón-Sta. Elena	18,000	37–41	Sceorro Atlanta	Sandstone	Eocene	1200 3000	4000 6000	600 2500	Faulted anticline
Carolina-Sta. Paula	....	28–31	Sceorro	Sand	Eocene	632	836	200	Steeply dipping erratic blocks
Concepción	....	38	Atlanta	Sand	Eocene	1100	3570	....	Structural strat. trap
El Cautivo	....	39–44	Sceorro	Sand	Eocene	750	1000	250	Steeply dipping erratic blocks
El Tambo	....	....	Sceorro	Sand	Eocene	....	4000	....	Structural strat. trap
El Tigre	200	39	Atlanta	Sand	Eocene	2900	4300	400	Structural strat. trap
Petrópolis	100	35	.....	Shattered Chert	Eocene	.....	2000	....	Steeply dipping erratic blocks

ECUADOR—Santa Elena Fields and Concessions



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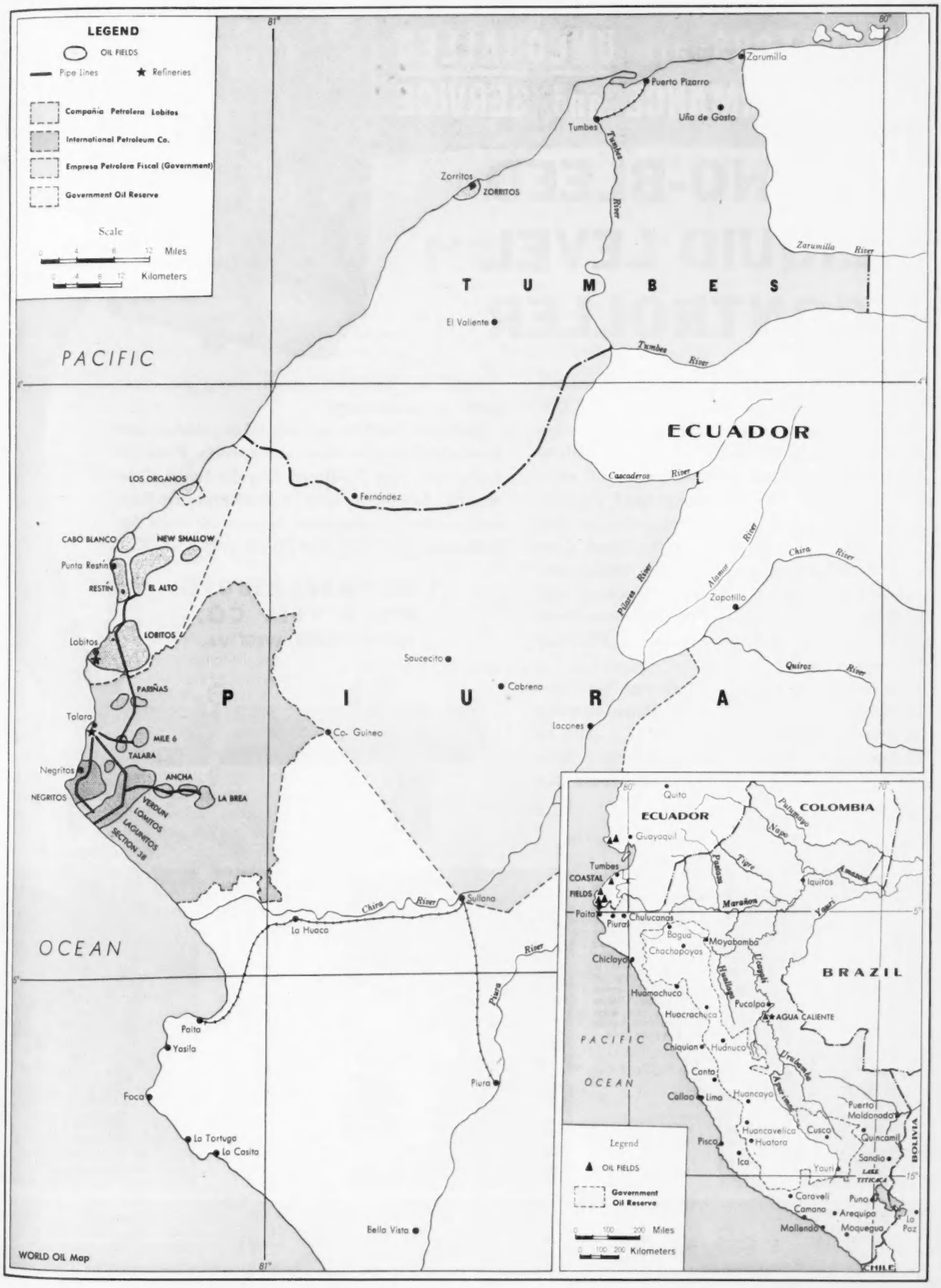
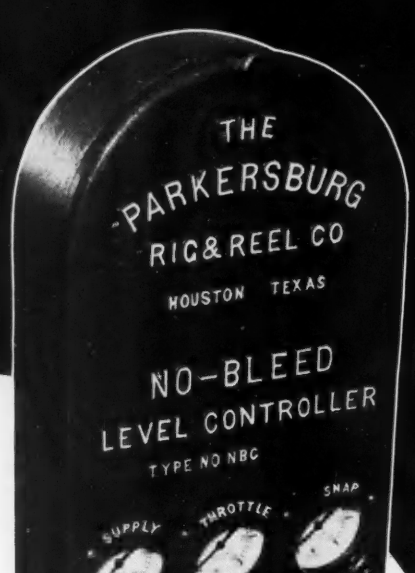

LEGEND
OIL FIELDS
Pipe Lines
Refineries
Compañia Petrolera Lobitos
International Petroleum Co.
Empresa Petrolera Fiscal (Government)
Government Oil Reserve
Scale
Miles
Kilometers
PACIFIC
OCEAN
ECUADOR
COLOMBIA
BRAZIL
BOLIVIA
CHILE
T U M B E S
P I U R A
Zarumilla
Puerto Pizarro
Uña de Gato
Tumbes
Zorritos
ZORRITOS
El Valiente
Fernández
LOS ORGANOS
CABO BLANCO
NEW SMALLOW
Punta Restín
RESTÍN
EL ALTO
Lobitos
LOBITOS
PARIÑAS
Talara
MILE 6
TALARA
Negritos
ANCHA
LA BREA
NEGRITOS
VERDUN
LOMITOS
LAGUNITOS
SECTION 38
Saucecito
Cabrena
Lacones
Co. Guineo
La Huaca
Sullana
Paita
Yasila
Foca
La Tortuga
La Casita
Piura
Bella Vista
Zapotillo
Quito
Guayaquil
Iquitos
Chulucanas
Bagua
Chachapoyas
Mayobamba
Chiclayo
Huamachuco
Pucalpa
Huacrachuca
AGUA CALIENTE
Chiquian
Huánuco
Canta
Callao
Lima
Huancayo
Huancavelica
Huatora
Pisco
Ica
Cusco
Puerto Maldonado
Quincamil
Sandia
Yauri
LAKE TITICACA
Caraveli
Puno
Camana
Arequipa
Mollendo
Moquegua
La Paz
Legend
OIL FIELDS
Government Oil Reserve
WORLD OIL Map

HERE'S WHY

PARKERSBURG HORIZONTAL SEPARATORS are UNEQUALLED for PERFORMANCE and SERVICE



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Only Parkersburg Horizontal Separators have the NO-BLEED LIQUID LEVEL CONTROLLER. Designed specifically and exclusively for these separators, the No-Bleed Controller gives you positive on and off snap action or hair line throttling level control. Passing only enough gas to pressure the dump valve diaphragm, the No-Bleed Controller reduces corrosion to a minimum; eliminates pilot regulator freezing and plugged orifices; gives you freedom from all the troubles and weaknesses of bleeding type controllers.

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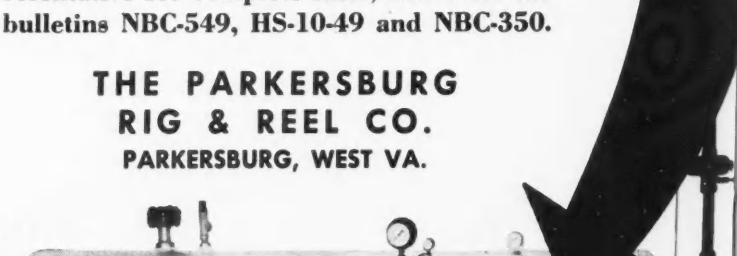
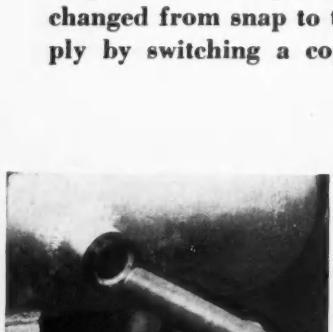
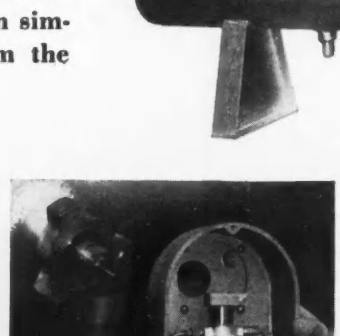




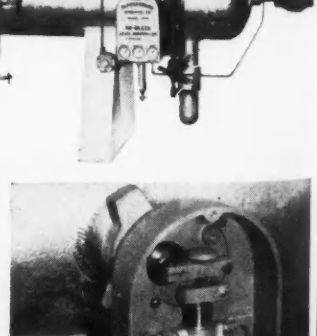
LEFT: Float, float arm and torque tube being inserted in separator. Torque tube is not supported on float end. No heavy flange connections are necessary. Entire assembly is held in position by ring nut on special 3" collar in separator. Notice "O" ring seal which becomes even tighter as pressures get higher.

No. 5004



LEFT: With float and torque tube assembly installed and properly positioned, the pilot and control unit is attached by tightening one set screw.

RIGHT: Controller installed and ready for snap action service. Note the knurled cap screw by which the liquid level and dumping range are adjusted. Notice the rugged, clean-cut construction of the entire unit.



PARKERSBURG

PARAGUAY

UNION Oil Paraguay ceased exploratory activities in the country late in 1949. By forfeiting the exploratory grant the company climaxed five years of oil search in Paraguay, in which time five test wells were drilled and a great deal of surface work was accomplished. The five dry holes drilled in the Gran Chaco region involved an expenditure the company did not wish to continue in view of the present world oil situation.

Paraguay is virtually one of the last remaining oil frontiers in South America, and the vast Chaco region was definitely a question mark because of its level surface and lack of significant outcrops throughout the entire area. The search was instigated in this large area east of the Andean foothills on the strength of producing fields in similar areas in Peru, Bolivia and Argentina. In fact, all of Argentina's oil fields, with the exception of the large Comodoro Rivadavia field, are located in the east Andean belt. The discovery of oil in the country would be a boon to the economy, which at present is stalemated because of lack of industrial development.

PERU

PERU increased its oil output by about 700,000 barrels in 1949 for a total annual production of 14,796,091 barrels. This is not a spectacular figure when compared with Venezuela, but Peru holds a respectable position in relation to the other oil-producing countries of South America.

The oldest oil producing country on the continent does well to increase production in view of the fact that no new fields have been discovered in the past seven years. Production is upheld by agressive development in the existing fields but this trend cannot be expected to continue indefinitely. Indications now are that this problem will be resolved with the anticipated enactment of a new petroleum law late this year. That the law will be favorable to outside operators is indicated by the recent entrance into Peru of a Conorado Petroleum Corporation gravity meter crew, which will survey the Sechura Desert Basin in the north coastal area of the country. International Petroleum Company, which operates the big La Brea-Parinas field, also plans to go afield with geological surveys and possible test drilling in the Pucalpa area and up to 35 miles from the eastern frontier. Peru's governmental oil agency, Empresa Petrolera Fiscal, is reportedly favorable to outside help in searching for oil—especially from the U. S. Provisions of the proposed new oil law have met with the approval of most outside oil interests, and if enacted the law should improve Peru's status as a producer.

Drilling activity during 1949 centered mainly on the La Brea-Parinas field where 80 oil completions resulted from 125

Drilling in Peru

DEPARTMENT and FIELD	WELLS COMPLETED IN 1948					WELLS COMPLETED IN 1949					Wells Drilling End of 1949
	Oil	Gas	Dry	TOTAL Wells	TOTAL Footage	Oil	Gas	Dry	TOTAL Wells	TOTAL Footage	
LORETO:											
Wildcats	....	....	1	1	1,000	....	..	1	1	4,650	..
PIURA:											
La Brea y Pariñas	77	5	40	122	412,979	80	2	43	125	427,746	5
Lobitos	9	..	..	9	17,361	8	1	..	9	28,047	2
Los Organos	5	..	1	6	8,060	3	..	3	6	6,967	3
Restín-El Alto	36	..	1	37	77,322	51	..	2	53	84,165	10
Total	127	5	43	175	516,722	142	3	49	194	551,575	20

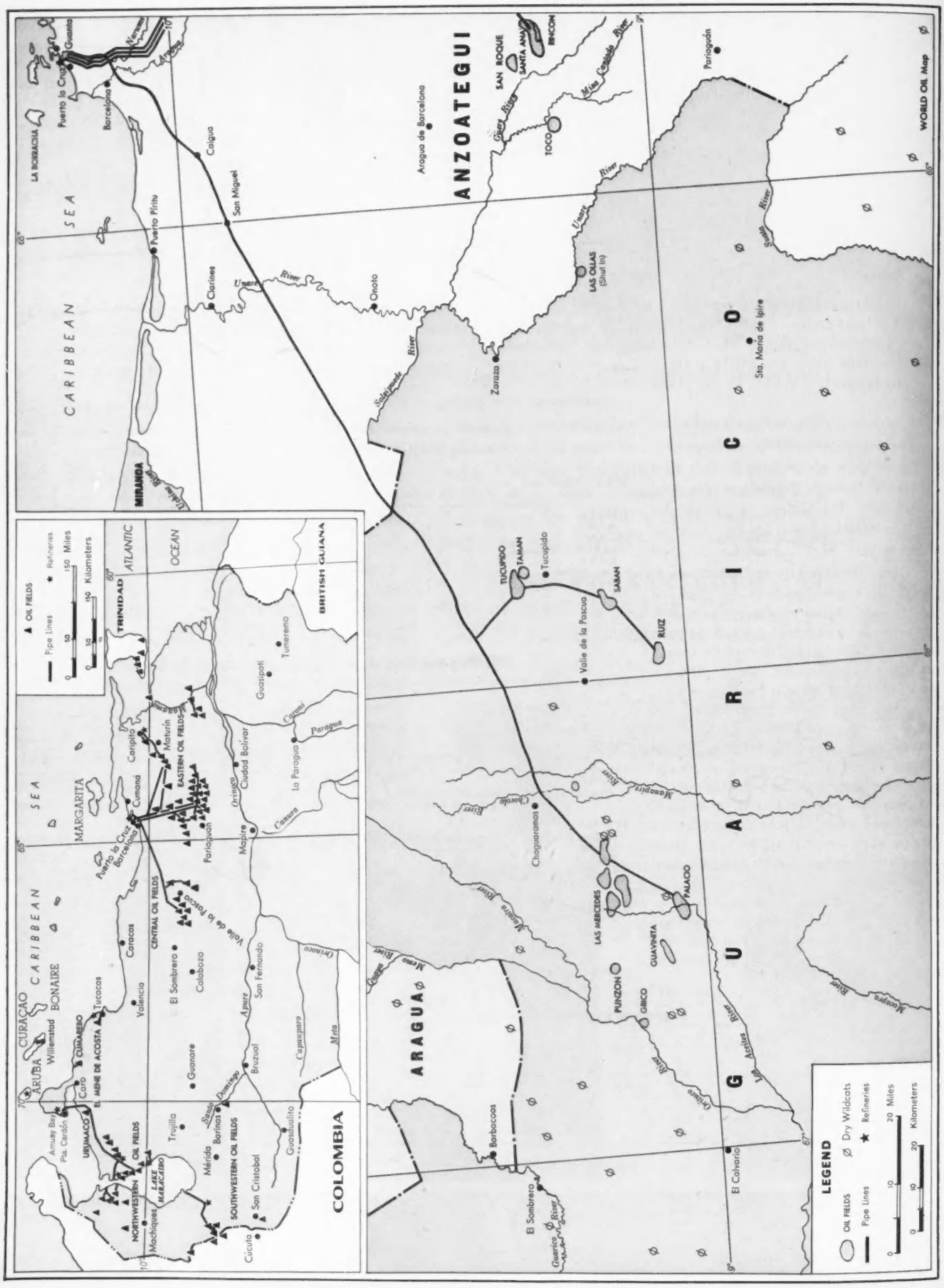
Oil Production and Producing Wells in Peru

DEPARTMENT and FIELD	Operating Company	Year of Discovery	WELLS PRODUCING END OF 1949 Flowing	Art. Lift	Total Prod.	CRUDE OIL PRODUCTION—(Barrels) Daily End of 1949	Year 1948	Year 1949	Cumulative Through 1949
HUANUCO:									
Agua Caliente	Compañia de Petróleo Ganso azul Limitada	1932	6	....	6	384	120,810	140,196	664,408
PIURA:									
La Brea y Pariñas	International Pet. Co.	1875	225	2,341	2,566	32,638	11,362,498	11,912,964	312,015,398
Lobitos	Cia. Petrolera Lobitos	1901	28	216	244	2,215	790,163	808,467	70,190,089
Restín-El Alto		1904	26	701	727	4,968	1,682,806	1,813,312	
Los Organos	Empresa Petrolera Fiscal	1943	....	15	15	285	97,578	103,861	587,032
TUMBES:									
Zorritos-Copé	Empresa Petrolera Fiscal	1865	....	42	42	47	15,025	17,291	3,675,760
Total		....	285	3,315	3,600	40,537	14,068,880	14,796,091	387,132,687

Engineering and Geological Data on Peru Fields

DEPARTMENT and FIELD	Proved Area (Acres)	Gravity Oil (API)	PRODUCING FORMATION Local Name	Kind	Age	DEPTH (Feet) Minimum to Top of Pay	Maximum to Bottom of Pay	Type of Structure
HUANUCO:								
Agua Caliente	1,000	44	Agua Caliente, Ash-Bed	Sand	L. Cretaceous	1000	1300	Dome
PIURA:								
La Brea y Pariñas	20,000	34-37	Verdún Talara-Pariñas-Salinas Talara	Sand	Eocene	60	6000	Faulted and Folded
Lobitos	5,000	34-36	Terebratula	Sand	U. Eocene	142	6500	Block Faulting
Los Organos	250	44	Talara-Conglomerate Lomitos	Sand	U. Eocene	100	6600	Monocline and Faulted Blocks
Restin El Alto	10,000	34-36	L. Caverno	Sand	U. Eocene	1800	2400	Block Faulting
TUMBES:								
Zorritos	1,000	38	Zorritos	Sand	Miocene	1200	1800	Monocline and Block Faulting

VENEZUELA—Central Fields



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PERU—Continued

wells drilled, and the Restin-El Alto field which gained 51 oil producers out of 53 wells drilled. There were 20 wells drilling in the existing fields at the close of the year. One wildcat was completed in November, 1949, east of the Andes by a small private group known as the Compania de Petroleo "El Oriente." The well, Inca 1, was abandoned at 4650 feet after encountering caving red beds from the surface to 3520 feet. Difficult drilling in these Tertiary sediments discouraged further drilling in the immediate area. Much of the Montana region has been test drilled at infrequent intervals by both the government and private capital but has not yet developed any new encouraging oil prospects. Geologically, the region is promising and more work will probably be carried on there in the next few years. The scope of mountain operations is such that the government cannot undertake the work alone. An official of International Petroleum Company estimated that it would require $250 million to develop the area properly, a cost which could be best borne by a group of oil interests. The investment would include a 360-mile trans-Andean pipe line, the drilling of 250 more producing wells, and the extension of known reserves. At least ten years would be required to carry out such a program.

Gas Production and Producing Wells in Peru

DEPARTMENT and FIELD	Producing Gas Wells End of 1949	GAS PRODUCTION—(Thousand Cubic Feet) Daily at End of 1949	Year 1948	Year 1949	Cumulative Through 1949
PIURA:					
La Brea y Pariñas	33*	61,177	20,494,413	22,329,783	n.a
Lobitos Restin El Alto	639	24,459	9,169,272	8,927,738	n.a
Total	672	85,636	29,663,685	31,257,521	n.a.

Note: Operated by same Companies also producing crude.
* Gas wells exclusively, producing no crude.
n.a.—Not available.

VENEZUELA

CRUDE production in Venezuela dropped about 13 million barrels in 1949 compared with the previous year, for a total of 457,176,447 barrels, or a daily average of 1,252,000 barrels.

The large drop was almost wholly due to decreased demand. In 1948 the total world crude supply exceeded the total demand by 471,000 barrels daily and as a consequence output was curtailed in two of the major producing countries in 1949. The U. S. and Venezuela were forced to reduce their output because of loss of some dollar markets in areas which switched to sterling oil. Conversely, Middle East and other areas increased their outputs during 1949 to sterling markets, which further reduced demand from the hard currency countries. Another factor which affects demand for Venezuelan crude is the lower cost of the Middle East oil. Upon completion of the pipe lines, planned, and under construction, from the Middle East to the Mediterranean, Venezuela will feel a greater pinch on her European markets. Possible cuts in oil imports into the U. S. would further affect Venezuela but this problem has not developed as yet.

Venezuela's economy is based almost entirely on its oil trade as evidenced by the fact that last year oil exports amounted to almost $1070 million as against $49 million of all other exports. With this uneven balance toward oil, any reductions in output seriously affects the country's economic well-being. For example, early this year about 18,000 oil workers were laid off as a result of reduced oil demand.

Western Venezuela accounts for two-thirds of the country's oil production with a daily production at the end of 1949 of 841,545 barrels. About 20 percent of this production is light oil from the Cretaceous limestone fields west of Lake Maracaibo and the remainder is heavy oil from the Bolivar coastal fields along the east shores of the lake.

There were 630 field wells drilled in Venezuela during 1949, of which 588 were oil productive, 2 were gas wells and 40 were dry holes. At the end of the year 67 field wells were drilling. The yearly total of field wells drilled is a sharp drop from the 839 such wells drilled in 1948, and the down-

Refineries of Venezuela

COMPANY	Location of Plant	Crude Charging Capacity (Bbls. Daily)	Cracking Capacity (Bbls. Daily)	Type of Refinery
British Controlled Oilfields, Ltd.	Mene de Mauroa	250	None	Skimming
Creole Petroleum Corporation	Bay of Amuay	60,000	*7,000	Complete
	Caripito	70,000	35,000	Complete
	La Salina	12,000	None	Skimming
Mene Grande Oil Company	Cabimas	1,800	None	Skimming
	Oficina	930	None	Skimming
	San Lorenzo	41,000	None	Skimming
Shell Group	Punta Cardón	40,000	40,000	Complete
Sinclair Oil Company	Puerto la Cruz (Building)	35,000	None	Complete
Socony-Vacuum Oil Company	Guario	120	None	Skimming
Venezuela Gulf Refining Co.	Puerto la Cruz (Building)	30,000	None	Complete

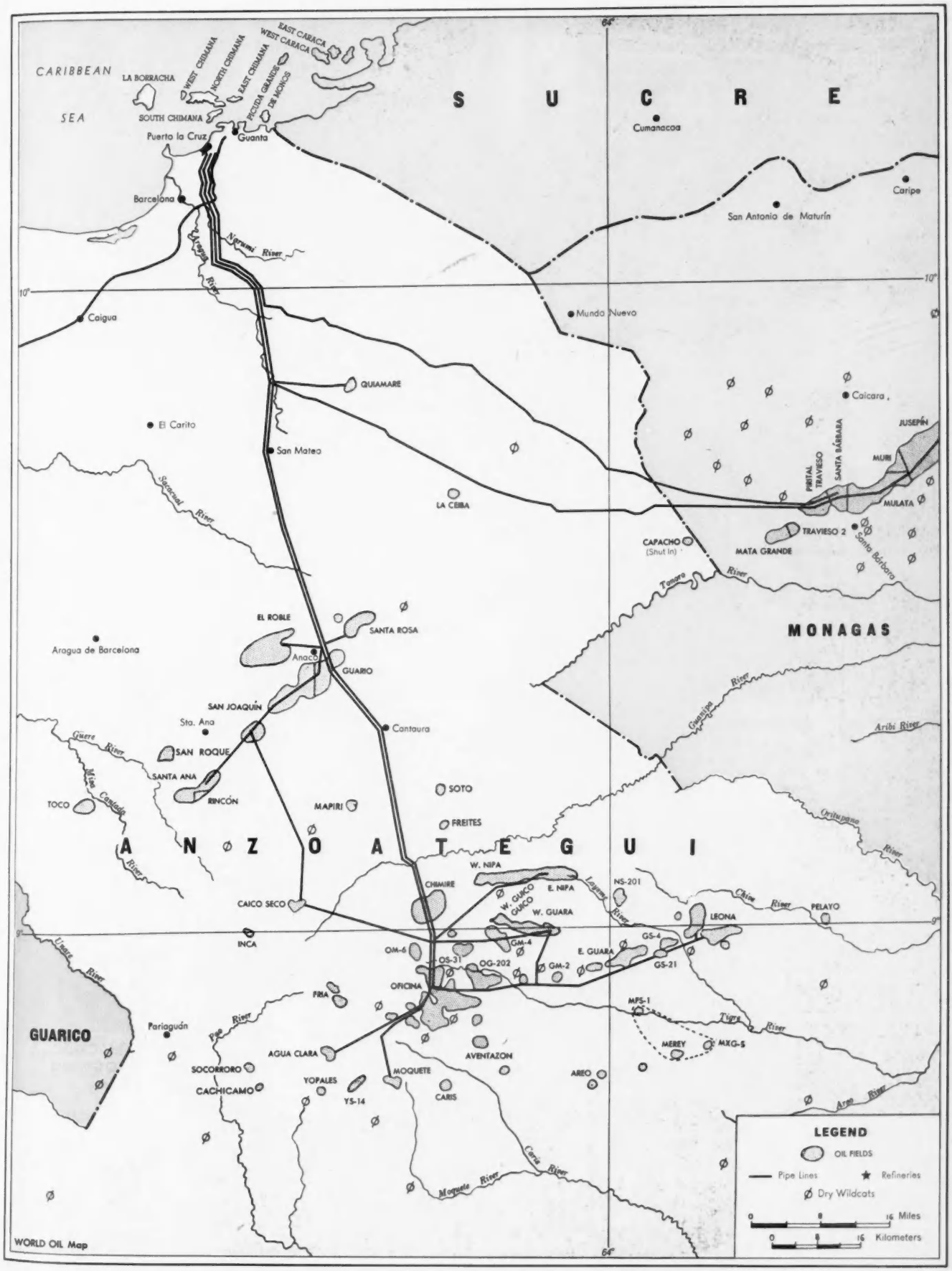
* Hydroforming capacity.

Crude Oil Pipe Lines of Venezuela

COMPANY	Origin	Terminus	Length (Miles)	Diameter (Inches)
EASTERN VENEZUELA:				
Creole Pet. Corp.	Cumarebo	Tucupido	2.5	6
	Jusepin	Travieso	16	16
	Jusepin	Caripito	46	10
	Mulata	Travieso	7.4	10
	Quiriquire	Caripito	21	10, 16
	Temblador	Boca de Uracoa	34	10
Mene Grande Oil Co.	Anaco	Puerto La Cruz	60	16
	Oficina	Anaco	36	16
	Travieso	Puerto La Cruz	94.5	16
S. A. Petrolera Las Mercedes	Guasimito	Pamatacual	157	16
Sinclair Oil & Refg. Co.	Muri	Santa Bárbara	9.3	8
	Santa Bárbara	El Chaure	95	12
Socony-Vacuum Oil Co.	Guico	Puerto La Cruz	103	12
Venezuelan Atlantic Refining Company	Avipa	Santa Bárbara	3.7	....
	Pelayo	Leona	12	6
	Ruiz	Sabán	10.7	8
	Sabán	Tucupido	16	8
	Tamán	Tucupido	3.2	6
	Tucupido	Las Palmas	11.3	8
WESTERN VENEZUELA:				
British Controlled Oilfields, Ltd.	Hombre Pintado	Media	8	4
	Media	El Mene	4.7	3, 4, 6
Creole Pet. Corp.	Punta Gorda	La Salina	28.6	10, 12, 16
	Rio Ulé	Puerto Gorda	21	10, 12, 16
	Ulé	Amuay	142	24, 26
Mene Grande Oil Co.	Pueblo Viejo	Lagunillas	11	8
	Bachaquero	Lagunillas	16.7	12
	Tasajeras	Lagunillas	9	10
	Taparito	Cabimas	11	12
	Punta Benitez	Cabimas	6	12
	Taparito	Punta Benitez	5	12
	Mara	Texas-Creole Sta.	4.2	8
	Texas-Creole Sta.	Tres Bocas	4	10
	Mara	Tres Bocas	7	6, 12
	Tres Bocas	Palmarejo	10	12
	Netick	La Paz	8.7	3, 4
Phillips Oil Company	San Roque	Santa Ana	5.6	6
	Mata Grande	Santa Bárbara	6.6	6
Richmond Exploration Company	Boscán	Bajo Grande	25	18
Shell Group	Sibucara	Palmarejo	10	12
	La Paz	Palmarejo (via La Concepción)	30	10, 12
	La Paz	Palmarejo (vis Cuatro Bocas)	36.7	10, 12
	La Paz	La Concepción	12	6
	Mene Grande	San Lorenzo	9.6	8
	Mara	Cuatro Bocas	5	12
	Cuatro Bocas	Palmarejo	20	10, 12
	Casigua	La Solita	85.5	8

VENEZUELA—Eastern Fields

(See Eastern Continuation of this Map on Page 148)



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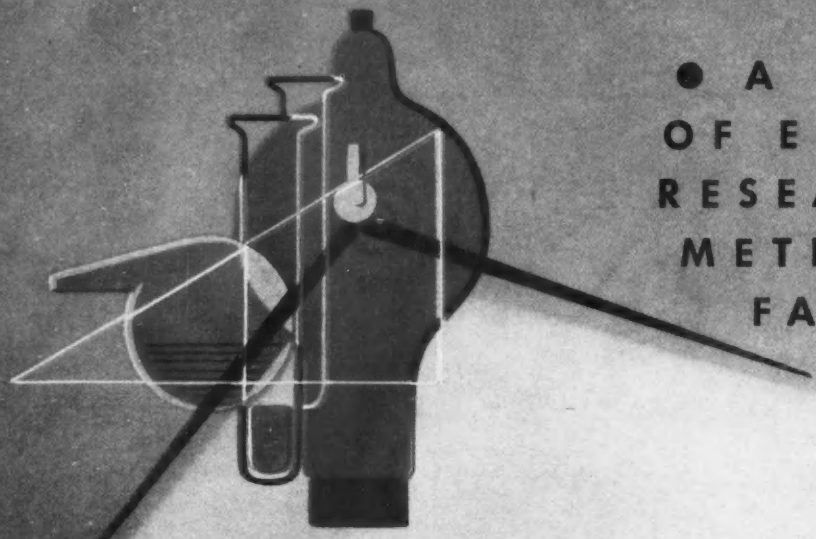

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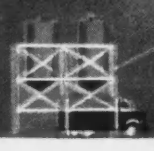

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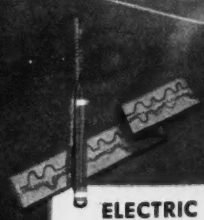

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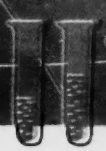

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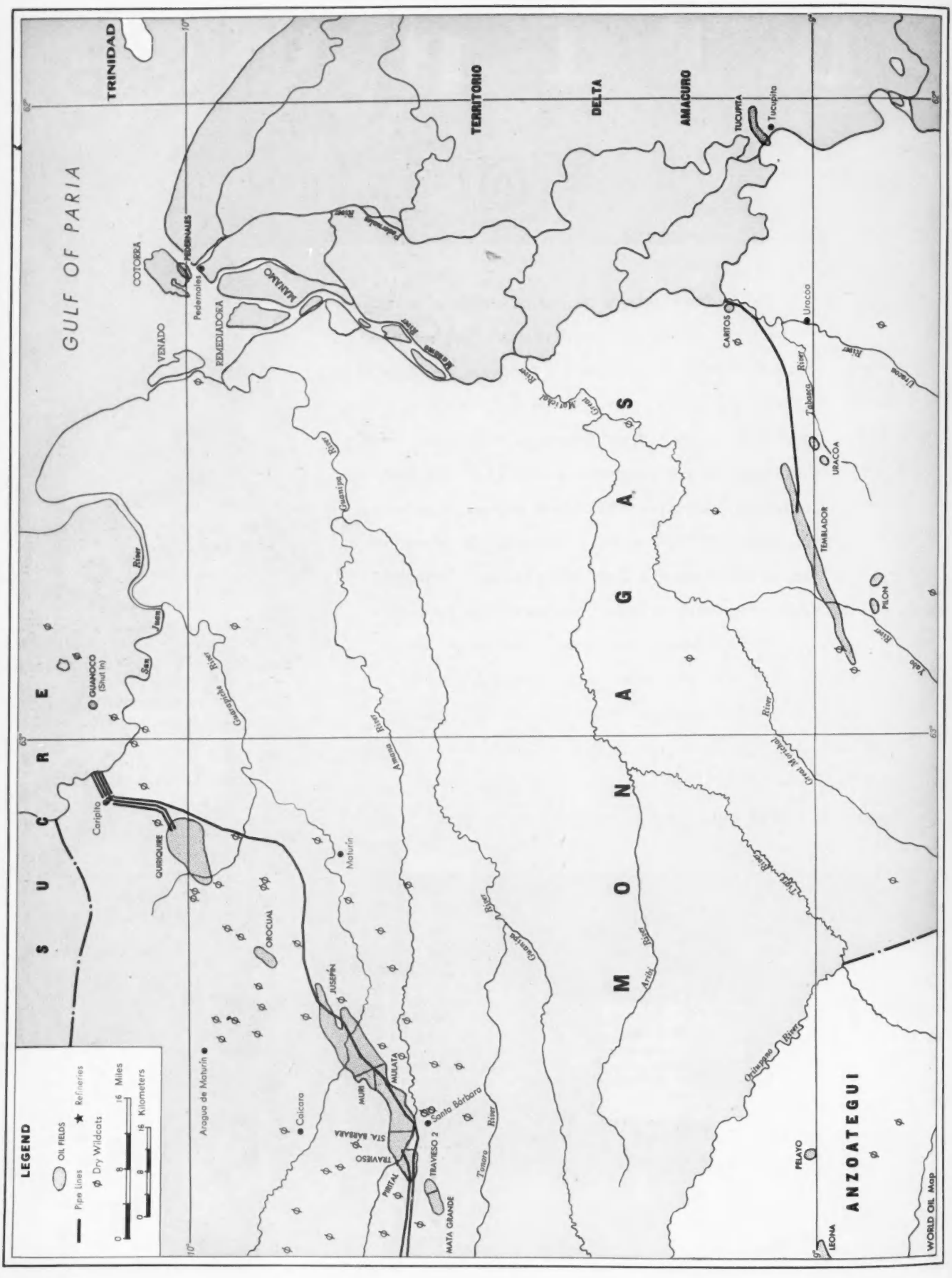
VENEZUELA—Eastern Fields

(See Western Continuation of this Map on Page 145)



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VENEZUELA—Continued

ward trend will probably continue as demand falls off. Forty wildcats were completed during 1949 for a total footage of 324,446. Of these, 10 were oil productive, 1 was a gas well, and 29 were dry. At the year's close 14 wildcats were being drilled. As a result of the drilling operations in 1949, six new fields were discovered in Eastern Venezuela and two in Western Venezuela. Probably the most significant discovery during the year was the San Roque field found by Phillips Venezuelan Oil Company. Located 13 miles south of Aragua de Barcelona, in the state of Anzoatequi, the field produced 1,109,088 barrels of oil from ten wells in 1949 after its discovery early in the year. Production is from about 7700 feet and the light 45-gravity oil will find a better market than the average Venezuelan heavy oil. At the beginning of this year Phillips was drilling six more wells in the San Rogue field.

Another important discovery in 1949 was Venezuelan Atlantic Refining Company's Taman field, a short distance southeast of the same company's Tucupido field in Guarico. Eleven wells produced 782,533 barrels of light-gravity oil during the year from Miocene sands ranging from 2970 to 5640 feet. In addition to the above two fields discovered in Eastern Venezuela during the year, are the Freites field brought in by Creole Petroleum Corporation, the Inca field discovered by Mene Grande Oil Company, both in Anzoatequi; the Punzon field discovered by the Texas Petroleum Company, and the Ruiz field discovered by Venezuelan Atlantic Refining Company, both in Guarico. In Western Venezuela, Richmond Exploration Company discovered the Macoa field west of Lake Maracaibo, and the Venezuelan Oil Concessions, Ltd., found the Lacustre field, which has not yet been given an outlet.

The problem of reduced demand for Venezuelan crude was met largely by voluntary reductions in output on the part of major producers in the country. The government suggested the voluntary cuts and the companies readily obliged since the interests of both parties in the matter are similar. Creole, the largest producer with a daily average of about 620,000 barrels in 1949, made the largest cut, and reduced its daily average to about 520,000 barrels early this year. Shell, the second largest producer, reduced output about 30,000 barrels daily as a courtesy measure as the company can sell all its output in sterling areas. Mene Grande, the third highest producer, cut its daily average about 75,000 barrels. The Texas Company cutback about 20,000 barrels daily, and Richmond reduced output about the same amount.

Foreign oil interests have enjoyed more freedom of operation and cooperation from the government in Venezuela than in any other South American country. Continued reductions of oil exports may well reduce some of these benefits as the government will be forced to look for new avenues of revenue. Tightening of oil regulations and changes in royalty payments would seriously affect many large U. S. oil companies now operating in the country. At the very least, reduced income from oil will tend to reduce Venezuelan imports of

Drilling in Venezuela

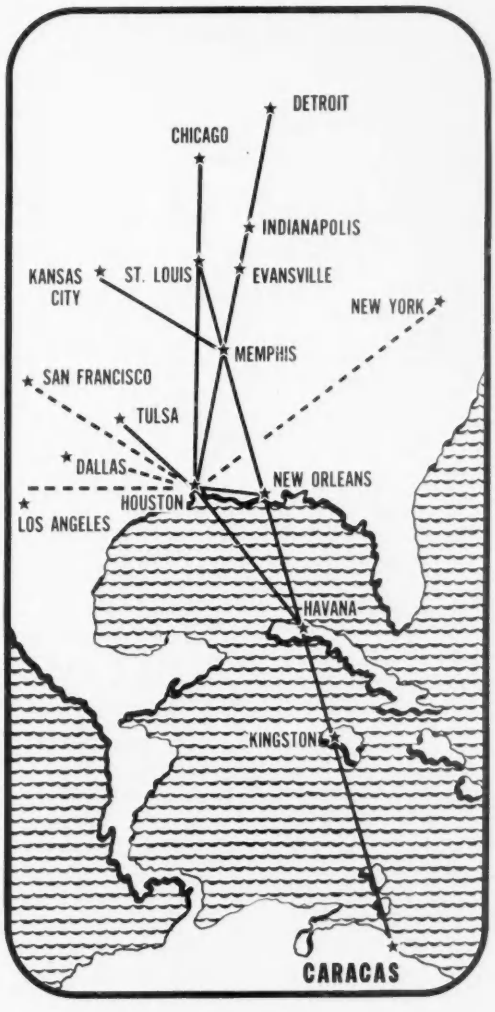
STATE AND FIELD	WELLS COMPLETED IN 1948					WELLS COMPLETED IN 1949					Wells Drilling End of 1949
				TOTAL					TOTAL		
	Oil	Gas	Dry	Wells	Footage	Oil	Gas	Dry	Wells	Footage	
EASTERN VENEZUELA:											
Anzoátegui:											
Cachicamo	..	..	..	..	.....	1	..	..	1	5,006	..
Caico Seco	..	1	..	1	7,576	1	..	1	2	15,225	..
Chimire	4	1	..	5	39,743	44	..	..	44	320,704	6
El Roble	3	..	..	3	31,063	4	..	..	4	41,388	4
Fria	7	..	..	7	43,300	1	..	..	1	6,162	..
Guara	29	..	2	31	210,542	19	..	2	21	139,302	..
Guario	5	..	..	5	28,171	1	..	..	1	4,494	1
Guico	8	..	1	9	65,812	2	..	..	2	11,139	..
Inca	1	..	..	1	7,150	3	..	..	3	21,378	1
Leona	8	..	..	8	64,368	3	..	1	4	31,914	..
Merey-Areo	..	..	..	..	.....	1	..	..	1	5,795	..
Nipa	37	..	..	37	314,858	50	..	..	50	421,883	5
Oficiana	14	..	1	15	93,504	10	..	1	11	67,353	2
Pelayo	2	..	1	3	23,601	..	..	1	1	7,523	..
San Joaquin	5	..	..	5	30,474	5	..	..	5	37,790	..
San Roque	..	..	..	..	.....	11	..	..	11	92,631	1
Santa Ana	2	..	..	2	17,076	2	..	..	2	16,432	2
Santa Rosa	2	..	..	2	17,611	3	..	1	4	43,328	1
Socororo	1	..	1	2	8,282	..	..	1	1	4,334	..
Toco	3	1	..	4	31,274	1	1	1	3	24,362	..
Yopales	6	..	..	6	27,888	7	..	1	8	37,660	1
Guárico:											
Guavinita	6	..	..	6	22,674	2	..	..	2	8,332	1
Las Mercedes	33	..	6	39	167,239	21	..	2	23	101,935	2
Palacio	23	..	4	27	94,510	8	..	1	9	32,588	1
Ruiz	..	..	..	..	.....	12	..	..	12	55,304	2
Sabán	6	2	12	20	42,818	3	1	2	6	18,673	..
Tamán	..	..	..	..	.....	12	..	2	14	60,484	3
Tucupido	15	1	..	16	89,806	17	..	5	22	106,524	..
Monagas:											
Jusepin	6	..	2	8	37,326	....	..	..	....	.....	..
Mata Grande	7	..	3	10	52,090	....	..	..	....	.....	..
Mulata	9	..	1	10	59,650	10	..	..	10	56,080	..
Quiriquire	66	..	5	71	297,776	46	..	3	49	203,934	3
Santa Bárbara	10	..	..	10	59,698	2	..	1	3	10,388	1
Temblador	14	..	4	18	73,301	4	..	..	4	15,796	..
Travieso	3	..	2	5	28,703	....	..	..	....	.....	..
Territorio Delta Amacuro:											
Pedernales	..	..	..	..	.....	3	..	..	3	21,982	1
Tucupita	18	..	..	18	102,048	5	..	..	5	29,496	..
Total Wildcats, Eastern	7	1	33	41	245,176	6	1	17	24	170,151	8
Eastern Total	360	7	78	445	2,435,108	320	3	43	366	2,247,410	45
WESTERN VENEZUELA:											
Barinas:											
Silvestre	2	..	..	2	19,649	....	..	..	....	.....	..
Falcón:											
El Mene	..	..	..	..	.....	....	..	..	....	.....	1
Hombre Pintado	3	..	..	3	4,444	1	..	..	1	1,700	..
Zulia:											
Amana	..	..	..	..	.....	....	..	1	1	6,202	..
Bachaquero	184	..	2	186	810,068	81	..	3	84	339,935	3
Boscán-Albaricos	20	..	..	20	141,512	22	..	1	23	174,402	1
Cabimas	5	..	..	5	14,886	13	..	..	13	44,543	1
El Cubo, Las Cruces	....	..	..	....	.....	2	..	1	3	9,375	..
Ensenada	....	..	..	....	.....	....	..	1	1	9,328	1
La Concepción	1	..	..	1	12,085	....	..	..	....	.....	..
Lagunillas	60	..	..	60	251,905	47	..	1	48	232,982	3
La Paz	5	..	..	5	45,087	9	..	..	9	86,623	3
Macoa	....	..	..	....	.....	....	..	1	1	11,940	..
Mara	9	..	1	10	93,383	16	..	2	18	165,538	9
Mene Grande	19	..	..	19	90,200	27	..	..	27	130,013	3
Netick	....	..	1	1	10,156	....	..	..	....	.....	..
Pueblo Viejo	2	..	..	2	7,736	....	..	..	....	.....	1
Sibucara	....	..	..	....	.....	1	..	..	1	13,451	1
Tia Juana	120	..	..	120	312,129	52	.	3	55	142,857	2
West Tara	1	..	..	1	9,614	3	..	..	3	28,555	1
Total Wildcats, Western	2	..	7	9	91,146	4	..	12	16	154,295	6
Western Total	433	..	11	444	1,914,000	278	..	26	304	1,551,739	36
TOTAL VENEZUELA	793	7	89	889	4,349,108	598	3	69	670	3,799 209	81

—DIRECT FLIGHTS—

Each way Every Day

to

VENEZUELA



Trans-Caribbean Air Route

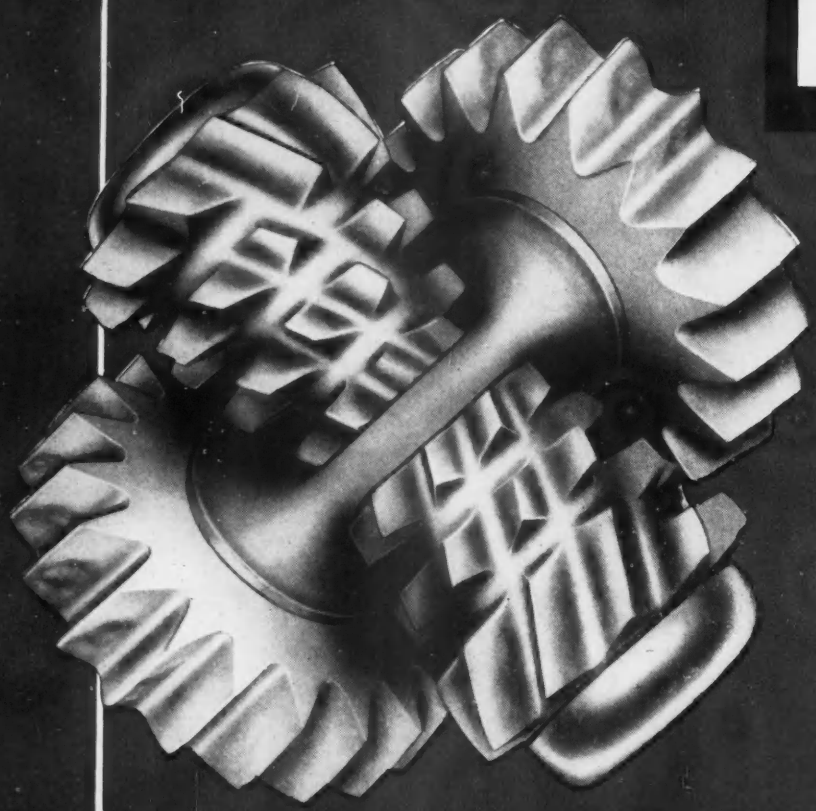
Chicago and Southern Air Lines' fleet of 4-motored Douglas Dixieliners now offers daily service through the gateways of New Orleans and Houston to Havana, Kingston, and Caracas with connections to all points in South America. Flights each way every day provide one plane service for business-man, vacationist, and cargo shipper from the Great Lakes to the Caribbean and South America. Ask your nearest C&S ticket office or travel agent for complete details.

CHICAGO & SOUTHERN AIR LINES

GENERAL OFFICES MEMPHIS, TENNESSEE, U.S.A.

C★S

H.C. SMITH ROCK BITS

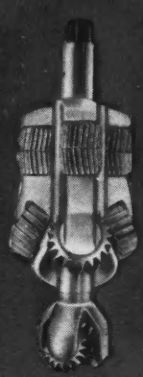


K-2P.

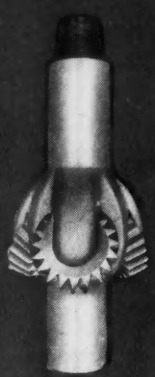
two-cone

there are 10 types of
H. C. Smith Rock Bits — each with
specially designed teeth
to drill specific formations.

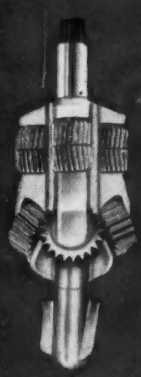
H.C. SMITH HOLE OPENERS



6-POINT HOLE OPENER WITH ROCK BIT PILOT



3-POINT HOLE OPENER

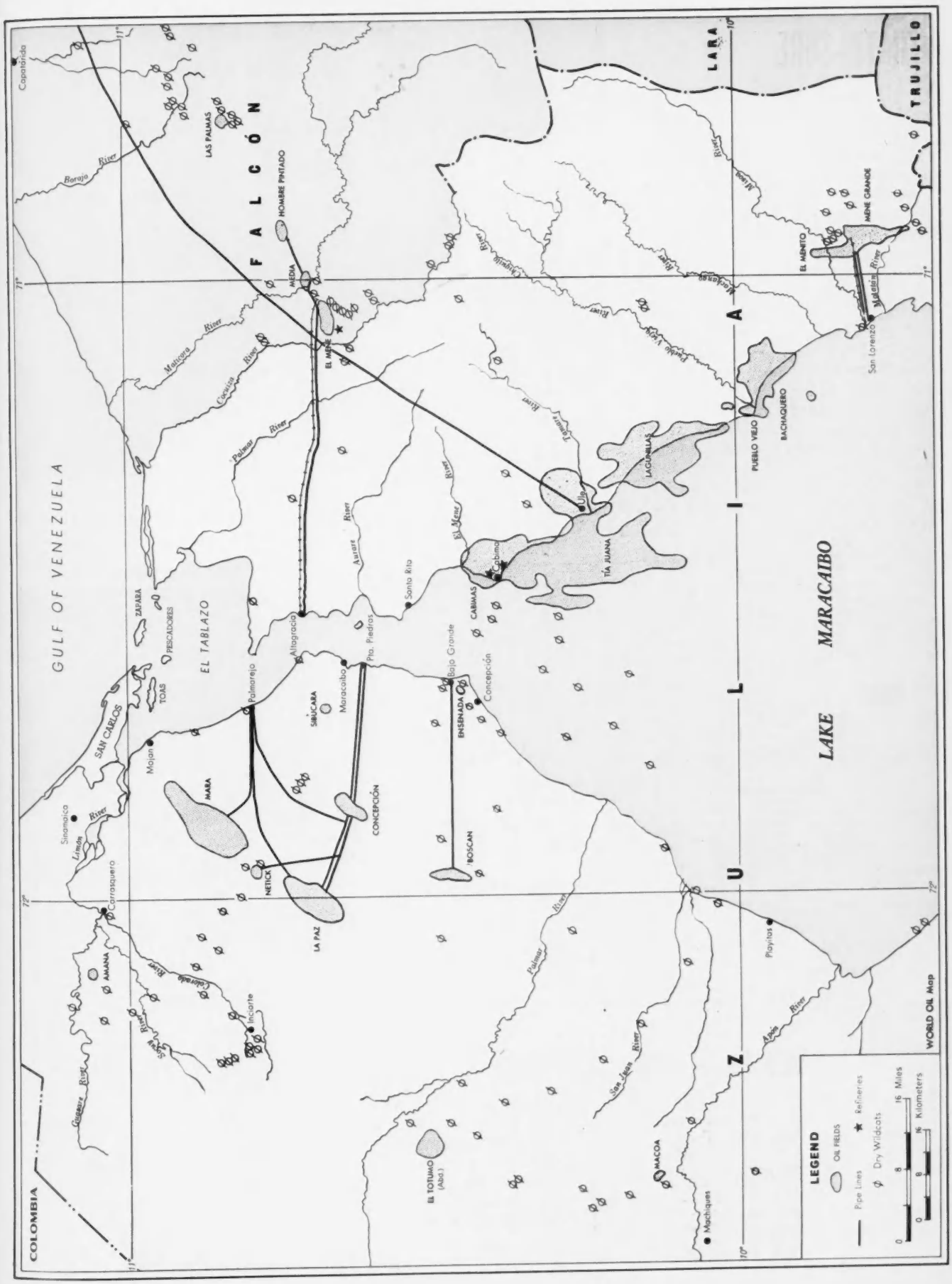


6-POINT HOLE OPENER WITH BULL NOSE PILOT

H C Smith
OIL TOOL CO.

GENERAL OFFICES, EXPORT OFFICE AND PLANT
COMPTON, CALIFORNIA

VENEZUELA—Northwestern Fields

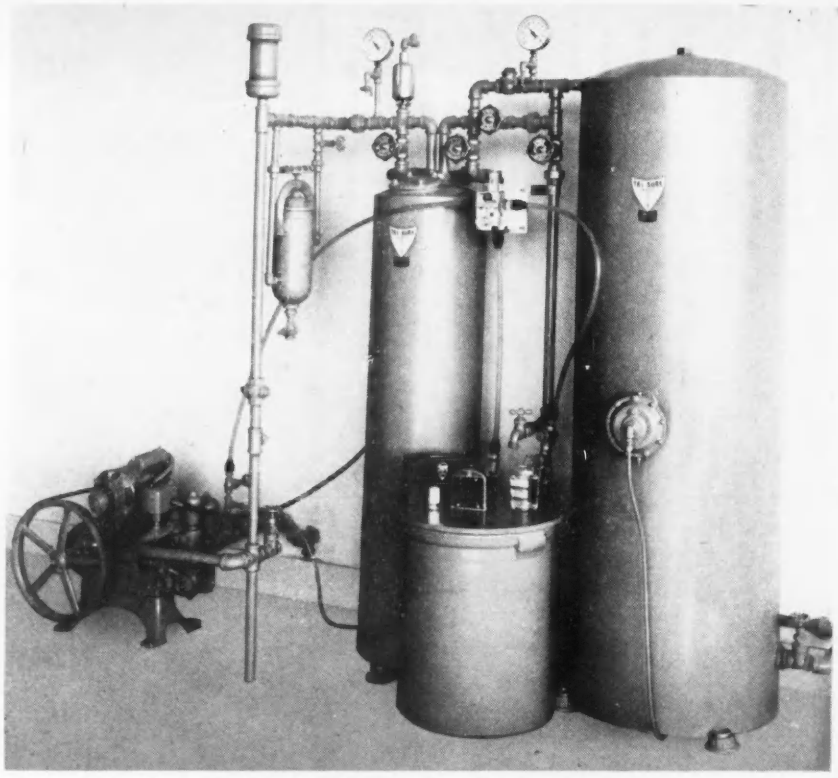


LAKE and SWAMP WATER FIT TO DRINK WITH TRI-SURE

"Oil is where you find it," and into the thickest jungle and wilderness go the exploration, production, and pipeline crews. These hard-working men get thirsty, but pure, good-tasting water can be harder to find than a bonanza field.

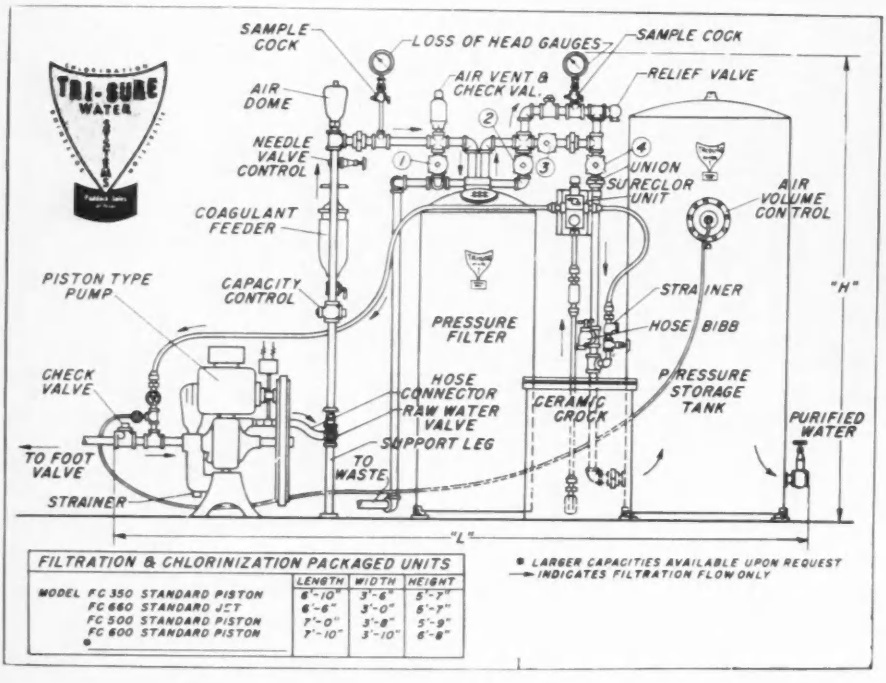
Not so anymore! If there's water present at all . . . and there is nearly always a swamp, river, pond or stream . . . there's a new way of making it pure and safe at low cost.

TRI-SURE WATER SYSTEMS, produced by Paddock Engineering Co. of Texas, Dallas, Texas, consist of a gasoline or electrically driven pump, alum feeder, filter, SURECLOR Automatic Water Chlorinating Unit (Chlorinator), and a pressure storage tank. It is a *packaged unit ready to install.* Merely drop a hose into the lake or swamp and start the pump. TRI-SURE automatically pumps, filters, and purifies the water.



TYPICAL TRI-SURE INSTALLATION

TRI-SURE readily breaks down into three sections for easy transportation and quick assembly. Skid-mounted units available.



FILTRATION & CHLORINIZATION PACKAGED UNITS

MODEL		LENGTH	WIDTH	HEIGHT
FC 350	STANDARD PISTON	6'-10"	3'-6"	5'-7"
FC 660	STANDARD JET	6'-6"	3'-0"	5'-7"
FC 500	STANDARD PISTON	7'-0"	3'-8"	5'-9"
FC 600	STANDARD PISTON	7'-10"	3'-10"	6'-8"

* LARGER CAPACITIES AVAILABLE UPON REQUEST
→ INDICATES FILTRATION FLOW ONLY

FOREIGN INSTALLATION

Field installation of TRI-SURE at Ambato, Ecuador during 1949 earthquakes.

PRESIDENCIA DE LA REPUBLICA

September 6, 1949

Mr. TOM E. COLLINS
4404 Caruth Street
Dallas, Texas

Dear Mr. Collins:

I don't know if you have heard that up to date we have had no epidemic outbreak in Ambato. This remarkable achievement is due, in no small part, to the Tri-Sure Water System donated by the Paddock Engineering Co. of Dallas, which was installed by you.

I just wanted to express my gratitude to the Paddock Engineering Co., Braniff Airways that brought the installation down, and to you for setting it up. You all did a great job that my country will not forget.

Sincerely,

Galo

GALO PLAZA

Letter of thanks from Galo Plaza, President of Ecuador.

ALSO REMOVES IRON AND SULPHUR

TRI-SURE readily removes these minerals, leaving the water clear and pure. Clean water is essential for cooling water systems.

TRI-SURE PREVENTS EPIDEMIC. When earthquakes laid to waste cities in Ecuador, a TRI-SURE was flown via Braniff Airways to Ambato. Water from a stream was pumped, filtered and chlorinated by TRI-SURE. For months, this unit served as the only water supply for the entire city. Not a single epidemic of typhoid, cholera, and other water borne diseases broke out. Only one of many foreign installations of TRI-SURE.

Dept. W. A. Paddock Sales of Texas, 3727 Atwell, Dallas, Texas Cable Address: PECO

VENEZUELA—Continued

Oil Production and Producing Wells in Venezuela

STATE and FIELD	OPERATING COMPANY	Year of Discovery	PRODUCING OIL WELLS END OF 1949			Daily at End 1949	CRUDE OIL PRODUCTION (Barrels)		
			Flowing	Art. Lift	Total		Year 1948	Year 1949	Cumulative Through 1949
EASTERN VENEZUELA:									
Anzoátegui:									
Anaco			....	....	....	16	.....	5,799	13,303
Caico Seco	Mene Grande Oil Company	1946	3	....	3	887	212,339	324,234	662,752
Capacho	Creole Petroleum Corporation	1945	....	....	....	.....	Shut in	Shut in	7,032
Chimiri	Creole Pet. Corp., Mene Grande, Socony-Vacuum Oil Co.	1948	46	....	46	17,511	221,678	6,393,084	6,614,223
El Roble	Pantepec Oil Company	1939	12	....	12	5,158	1,834,753	1,883,205	17,179,523
Freites	Creole Petroleum Corporation	1949	1	....	1	38	.....	13,762	13,762
Fria	Mene Grande Oil Company	1948	4	3	7	943	348,593	345,128	693,710
Guara	Mene Grande Oil Company	1942	103	24	127	67,564	27,886,876	24,661,819	134,055,873
Guario	Socony-Vacuum Oil Company	1940	22	....	22	6,246	2,347,005	2,279,991	11,543,719
Guico	Socony-Vacuum Oil Company	1944	35	....	35	12,290	6,187,190	4,484,808	25,073,097
Inca	Mene Grande Oil Company	1949	2	....	2	95	.....	34,543	34,543
La Ceiba	Mene Grande Oil Company	1946	1	....	1	151	73,660	54,268	230,260
Leona	Socony-Vacuum Oil Company	1940	20	3	23	5,604	1,940,921	2,044,593	10,693,213
Merey-Areo	Creole Petroleum Corporation, Mene Grande Oil Co.	1934	3	4	7	314	121,526	115,177	303,711
Nipa	Mene Grande Oil Co., Socony-Vacuum Oil Co.	1945	99	1	100	34,663	8,192,422	12,652,732	25,685,889
Oficina	Creole Petroleum Corp., Mene Grande Oil Co.	1933	109	84	193	40,619	16,071,953	14,826,257	153,358,692
Pelayo	Venezuelan Atlantic Refining Company	1947	3	....	3	314	59,842	114,982	192,905
Quiamare	Mene Grande Oil Company	1943	1	....	1	138	32,595	49,368	695,911
Rincon Largo	Texas Petroleum Company	1941	4	....	4	1,799	696,688	657,280	3,799,092
San Joaquin	Mene Grande Oil Company	1939	41	1	42	10,422	3,853,246	3,803,608	29,272,660
San Roque	Phillips Oil Company	1949	10	....	10	3,039	.....	1,109,088	1,109,088
Santa Ana	Mene Grande Oil Company	1936	7	....	7	2,516	391,670	918,579	2,534,133
Santa Rosa	Mene Grande Oil Company	1941	10	....	10	3,038	1,013,960	1,108,163	5,857,969
Toco	Mene Grande Oil Company	1948	4	....	4	2,069	373,844	756,204	1,130,039
Yopales	Mene Grande Oil Company	1937	12	6	18	3,440	569,687	1,255,657	2,786,777
Guárico:									
Guavinia	S. A. Petrolera Las Mercedes	1948	8	....	8	484	11,754	176,822	190,936
Las Mercedes	S. A. Petrolera Las Mercedes	1943	96	2	98	15,580	1,946,468	5,686,826	8,388,768
Palacio	S. A. Petrolera Las Mercedes	1947	37	1	38	5,051	586,298	1,842,844	2,430,740
Punzón	Texas Petroleum Company	1949	2	....	2	.....	.....	182	182
Ruiz	Venezuelan Atlantic Refining Company	1949	12	....	12	498	.....	181,772	181,772
Sabán	Venezuelan Atlantic Refining Company	1948	2	5	7	277	25,851	100,333	126,184
Tamán	Venezuelan Atlantic Refining Company	1949	11	....	11	2,144	.....	782,533	782,533
Tucupido	Venezuelan Atlantic Refining Company	1945	27	1	28	8,434	1,021,846	3,079,487	4,110,533
Monagas:									
Caritos	Texas Petroleum Company	1939	....	....	....	.....	8,221	Shut in	255,903
Jusepin	Creole Petroleum Corporation	1938	264	24	288	31,581	17,564,579	11,526,259	119,103,545
Mata Grande	Phillips Oil Company	1946	20	1	21	1,811	653,675	661,972	1,469,746
Mulata	Creole Petroleum Corp., Pantepec Oil Co.	1941	146	39	185	18,523	5,330,851	6,760,648	51,920,492
Muri	Sinclair Oil & Refining Company	1942	19	34	53	2,554	1,134,900	932,322	11,478,118
Orocual	Creole Petroleum Corporation	1933	....	....	....	.....	Abandoned	Abandoned	29,530
Pirital	Venezuelan Atlantic Refining Company	1944	1	....	1	25	8,753	8,240	87,527
Quiriquire	Creole Petroleum Corporation	1928	72	125	197	63,740	24,592,734	23,267,286	326,412,252
Santa Bárbara	Mene Grande Oil Co., Sinclair Oil & Refining Company	1941	157	47	204	19,190	5,473,124	7,005,235	61,237,123
Temblador	Creole Petroleum Corporation	1936	88	....	88	10,158	3,360,163	3,708,659	31,927,769
Travieso	Mene Grande Oil Company	1944	....	....	....	.....	4,621,407	.....	37,782,943
Travieso 2	Sinclair Oil & Refining Company	1944	....	9	9	340	151,601	124,284	850,493
Sucre:									
Guanoco	Texas Petroleum Company	1914	....	....	....	.....	Shut in	Shut in	1,718,918
Territorio Delta Amacuro:									
Pedernales	Creole Petroleum Corporation	1935	8	....	8	5,780	956,024	2,110,930	12,544,536
Tucupita	Creole Petroleum Corp., Texas Petroleum Company	1945	40	....	40	5,893	2,186,488	2,150,505	6,255,402
Eastern Totals		....	1,562	414	1,976	410,937	142,065,185	149,999,468	1,112,862,182
WESTERN VENEZUELA:									
Falcon:									
Cumarebo	Creole Petroleum Corporation	....	20	23	43	3,906	1,698,696	1,426,095	41,104,756
El Mene	British Controlled Oilfields, Ltd.	1921	....	26	26	365	143,985	133,939	24,832,302
Hombre Pintado	British Controlled Oilfields, Ltd.	1929	1	25	26	698	262,423	254,186	4,480,103
Las Palmas	Creole Petroleum Corporation	1929	....	....	....	.....	Shut in	Shut in	433,958
Media	British Controlled Oilfields, Ltd.	1928	....	....	....	.....	Shut in	Shut in	10,689,546
Mene de Acosta	Tocuyo Oilfields, Ltd.	1927	....	....	....	.....	Shut in	Shut in	778,067
Urumaco	Richmond Exploration Company	....	....	....	....	.....	Shut in	Shut in	1,289,841
Zulia:									
Amana	Guasare Oil Company	1943	3	....	3	99	.....	36,141	74,690
Bachaquero	Creole Pet. Corp., Mene Grande Oil Co., Venezuelan Oil Concessions, Ltd.	1938	466	106	572	83,840	40,585,710	30,613,410	158,666,413
Boscan-Albaricos	Richmond Exploration Company	1947	1	43	44	3,515	271,800	1,282,979	1,554,795
Cabimas	Creole Pet. Corp., Mene Grande Oil Co., Venezuelan Oil Concessions, Ltd.	1917	153	737	890	65,157	30,018,982	23,782,400	610,369,055
El Cubo, Las Cruces	Colon Development Company		24	109	133	12,227	2,595,756	4,462,743	113,347,860
El Menito	California Company	1924	....	....	....	.....	6,670	.....	6,705
Ensenada	Richmond Exploration Company	1948	1	....	1	77	761	28,002	28,763
La Concepción	Venezuelan Oil Concessions, Ltd.	1925	1	78	79	3,807	1,148,862	1,389,439	33,825,522
La Paz	Venezuelan Oil Concessions, Ltd.	1922	23	29	52	135,169	43,691,926	49,336,677	154,987,385
Lacustre	Venezuelan Oil Concessions, Ltd.	1949	1	....	1	.....	.....	.....	.....
Lagunillas	Creole Pet. Corp., Mene Grande Oil Co., Venezuelan Oil Concessions, Ltd.	1926	225	1,095	1,320	343,665	126,076,540	125,437,695	1,768,865,715
Los Manueles	Colon Development Company	1927	....	....	....	.....	1,049,927	.....	251,819,555
Macoa	Richmond Exploration Company	1949	4	....	4	37	.....	13,554	13,554
Mara	Creole Pet. Corp., Mene Grande Oil Co., Shell Caribbean Pet. Co., Texas Pet. Company	1945	27	....	27	.....	15,611,299	.....	29,183,636
Mene Grande	Shell Caribbean Petroleum Company	1913	5	318	323	47,179	16,338,415	17,220,507	338,393,276
Netick	Mene Grande Oil Company	1943	2	2	4	215	104,744	78,546	702,289
Pueblo Viejo	Mene Grande Oil Co., Venezuelan Oil Concessions, Ltd.	1940	11	6	17	2,790	3,135,451	1,018,799	9,271,074
Rio de Oro	Colon Development Company	1916	....	....	....	.....	Shut in	Shut in	24,360
Rio Palamar (Totumo)	Creole Petroleum Corporation	1915	....	....	....	.....	Abandoned	Abandoned	24,259
San José	Richmond Exploration Company	1948	....	....	....	.....	7,435	.....	7,435
Sibucara	Venezuelan Oil Concessions, Ltd.	1948	1	....	1	6,462	94,548	2,358,606	2,453,153
Tia Juana	Creole Pet. Corp., Mene Grande Oil Co., Venezuelan Oil Concessions, Ltd.	1928	177	517	694	132,337	66,331,576	48,303,261	601,935,662
West Tarra	Colon Development Company	1927	....	....	....	.....	511,896	.....	5,120,810
Western Totals		....	1,145	3,114	4,259	841,545	349,687,402	307,176,979	4,164,284,539
TOTAL VENEZUELA		....	2,708	3,528	6,236	1,252,482	471,519,881	457,176,447	5,210,145,781

VENEZUELA—Continued

ward trend will probably continue as demand falls off. Forty wildcats were completed during 1949 for a total footage of 324,446. Of these, 10 were oil productive, 1 was a gas well, and 29 were dry. At the year's close 14 wildcats were being drilled. As a result of the drilling operations in 1949, six new fields were discovered in Eastern Venezuela and two in Western Venezuela. Probably the most significant discovery during the year was the San Roque field found by Phillips Venezuelan Oil Company. Located 13 miles south of Aragua de Barcelona, in the state of Anzoatequi, the field produced 1,109,088 barrels of oil from ten wells in 1949 after its discovery early in the year. Production is from about 7700 feet and the light 45-gravity oil will find a better market than the average Venezuelan heavy oil. At the beginning of this year Phillips was drilling six more wells in the San Rogue field.

Another important discovery in 1949 was Venezuelan Atlantic Refining Company's Taman field, a short distance southeast of the same company's Tucupido field in Guarico. Eleven wells produced 782,533 barrels of light-gravity oil during the year from Miocene sands ranging from 2970 to 5640 feet. In addition to the above two fields discovered in Eastern Venezuela during the year, are the Freites field brought in by Creole Petroleum Corporation, the Inca field discovered by Mene Grande Oil Company, both in Anzoatequi; the Punzon field discovered by the Texas Petroleum Company, and the Ruiz field discovered by Venezuelan Atlantic Refining Company, both in Guarico. In Western Venezuela, Richmond Exploration Company discovered the Macoa field west of Lake Maracaibo, and the Venezuelan Oil Concessions, Ltd., found the Lacustre field, which has not yet been given an outlet.

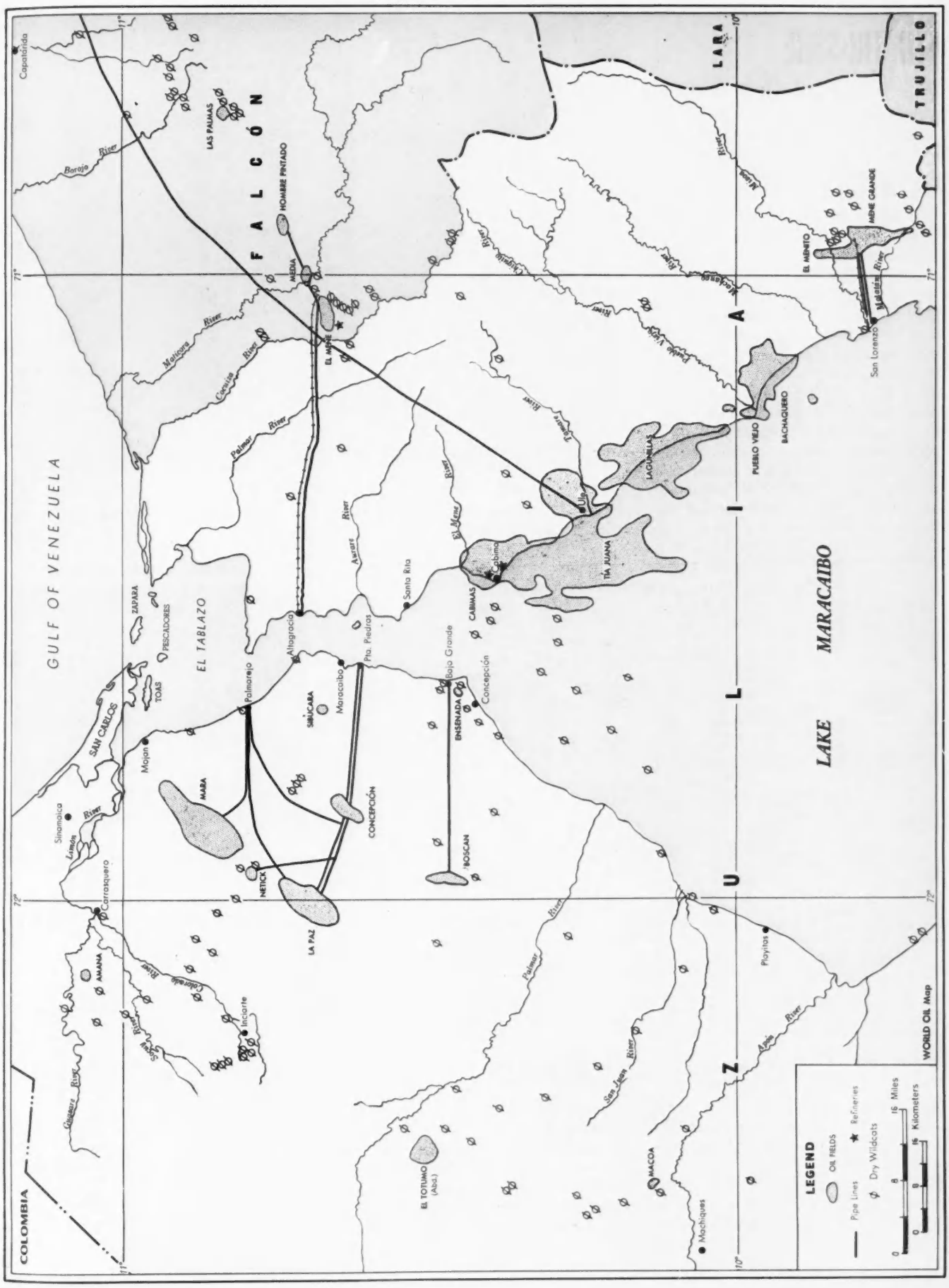
The problem of reduced demand for Venezuelan crude was met largely by voluntary reductions in output on the part of major producers in the country. The government suggested the voluntary cuts and the companies readily obliged since the interests of both parties in the matter are similar. Creole, the largest producer with a daily average of about 620,000 barrels in 1949, made the largest cut, and reduced its daily average to about 520,000 barrels early this year. Shell, the second largest producer, reduced output about 30,000 barrels daily as a courtesy measure as the company can sell all its output in sterling areas. Mene Grande, the third highest producer, cut its daily average about 75,000 barrels. The Texas Company cutback about 20,000 barrels daily, and Richmond reduced output about the same amount.

Foreign oil interests have enjoyed more freedom of operation and cooperation from the government in Venezuela than in any other South American country. Continued reductions of oil exports may well reduce some of these benefits as the government will be forced to look for new avenues of revenue. Tightening of oil regulations and changes in royalty payments would seriously affect many large U. S. oil companies now operating in the country. At the very least, reduced income from oil will tend to reduce Venezuelan imports of

Drilling in Venezuela

STATE AND FIELD	WELLS COMPLETED IN 1948					WELLS COMPLETED IN 1949					Wells Drilling End of 1949
				TOTAL					TOTAL		
	Oil	Gas	Dry	Wells	Footage	Oil	Gas	Dry	Wells	Footage	
EASTERN VENEZUELA:											
Anzoátegui:											
Cachicamo	....	..	..	....	.....	1	..	..	1	5,006	..
Caico Seco	....	1	..	1	7,576	1	..	1	2	15,225	..
Chimire	4	1	..	5	39,743	44	..	..	44	320,704	6
El Roble	3	..	..	3	31,063	4	..	..	4	41,388	4
Fria	7	..	..	7	43,300	1	..	..	1	6,162	..
Guara	29	..	2	31	210,542	19	..	2	21	139,302	..
Guario	5	..	..	5	28,171	1	..	..	1	4,494	1
Guico	8	..	1	9	65,812	2	..	..	2	11,139	..
Inca	1	..	..	1	7,150	3	..	..	3	21,378	1
Leona	8	..	..	8	64,368	3	..	1	4	31,914	..
Merey-Areo	....	..	..	....	.....	1	..	..	1	5,795	..
Nipa	37	..	..	37	314,858	50	..	..	50	421,883	5
Oficiana	14	..	1	15	93,504	10	..	1	11	67,353	2
Pelayo	2	..	1	3	23,601	....	..	1	1	7,523	..
San Joaquin	5	..	..	5	30,474	5	..	..	5	37,790	..
San Roque	....	..	..	....	.....	11	..	..	11	92,631	1
Santa Ana	2	..	..	2	17,076	2	..	..	2	16,432	2
Santa Rosa	2	..	..	2	17,611	3	..	1	4	43,328	1
Socororo	1	..	1	2	8,282	....	..	1	1	4,334	..
Toco	3	1	..	4	31,274	1	1	1	3	24,362	..
Yopales	6	..	..	6	27,888	7	..	1	8	37,660	1
Guárico:											
Guavinita	6	..	..	6	22,674	2	..	..	2	8,332	1
Las Mercedes	33	..	6	39	167,239	21	..	2	23	101,935	2
Palacio	23	..	4	27	94,510	8	..	1	9	32,588	1
Ruiz	....	..	..	....	.....	12	..	..	12	55,304	2
Sabán	6	2	12	20	42,818	3	1	2	6	18,673	..
Tamán	....	..	..	....	.....	12	..	2	14	60,484	3
Tucupido	15	1	..	16	89,806	17	..	5	22	106,524	..
Monagas:											
Jusepin	6	..	2	8	37,326	....	..	..	....	.....	..
Mata Grande	7	..	3	10	52,090	....	..	..	....	.....	..
Mulata	9	..	1	10	59,650	10	..	..	10	56,080	..
Quiriquire	66	..	5	71	297,776	46	..	3	49	203,934	3
Santa Bárbara	10	..	..	10	59,698	2	..	1	3	10,388	1
Temblador	14	..	4	18	73,301	4	..	..	4	15,796	..
Travieso	3	..	2	5	28,703	....	..	..	....	.....	..
Territorio Delta Amacuro:											
Pedernales	....	..	..	....	.....	3	..	..	3	21,982	1
Tucupita	18	..	..	18	102,048	5	..	..	5	29,496	..
Total Wildcats, Eastern	7	1	33	41	245,176	6	1	17	24	170,151	8
Eastern Total	360	7	78	445	2,435,108	320	3	43	366	2,247,410	45
WESTERN VENEZUELA:											
Barinas:											
Silvestre	2	..	..	2	19,649	....	..	..	....	.....	..
Falcón:											
El Mene	....	..	..	....	.....	....	..	..	....	.....	1
Hombre Pintado	3	..	..	3	4,444	1	..	..	1	1,700	..
Zulia:											
Amana	....	..	..	....	.....	....	..	1	1	6,202	..
Bachaquero	184	..	2	186	810,068	81	..	3	84	339,935	3
Boscán-Albaricos	20	..	..	20	141,512	22	..	1	23	174,402	1
Cabimas	5	..	..	5	14,886	13	..	..	13	44,543	1
El Cubo, Las Cruces	....	..	..	....	.....	2	..	1	3	9,375	..
Ensenada	....	..	..	....	.....	....	..	1	1	9,328	1
La Concepción	1	..	..	1	12,085	....	..	..	....	.....	..
Lagunillas	60	..	..	60	251,905	47	..	1	48	232,982	3
La Paz	5	..	..	5	45,087	9	..	..	9	86,623	3
Macoa	....	..	..	....	.....	....	..	1	1	11,940	..
Mara	9	..	1	10	93,383	16	..	2	18	165,538	9
Mene Grande	19	..	..	19	90,200	27	..	..	27	130,013	3
Netick	....	..	1	1	10,156	....	..	..	....	.....	..
Pueblo Viejo	2	..	..	2	7,736	....	..	..	....	.....	1
Sibucara	....	..	..	....	.....	1	..	..	1	13,451	1
Tia Juana	120	..	..	120	312,129	52	..	3	55	142,857	2
West Tara	1	..	..	1	9,614	3	..	..	3	28,555	1
Total Wildcats, Western	2	..	7	9	91,146	4	..	12	16	154,295	6
Western Total	433	..	11	444	1,914,000	278	..	26	304	1,551,739	36
TOTAL VENEZUELA	793	7	89	889	4,349,108	598	3	69	670	3,799 209	81

VENEZUELA—Northwestern Fields

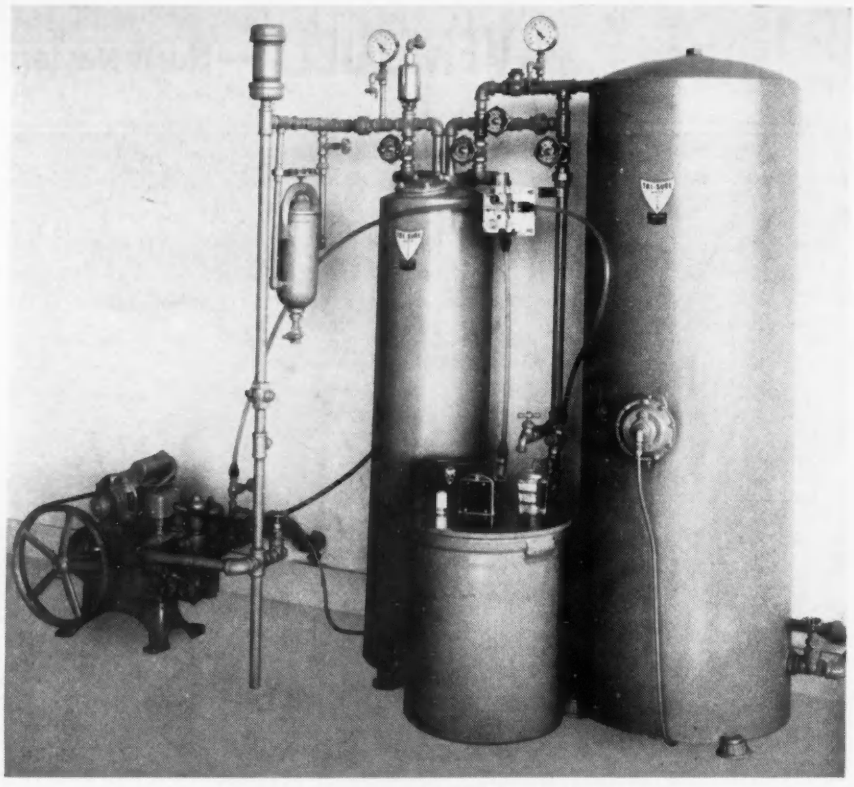


LAKE and SWAMP WATER FIT TO DRINK WITH TRI-SURE

"Oil is where you find it," and into the thickest jungle and wilderness go the exploration, production, and pipeline crews. These hard-working men get thirsty, but pure, good-tasting water can be harder to find than a bonanza field.

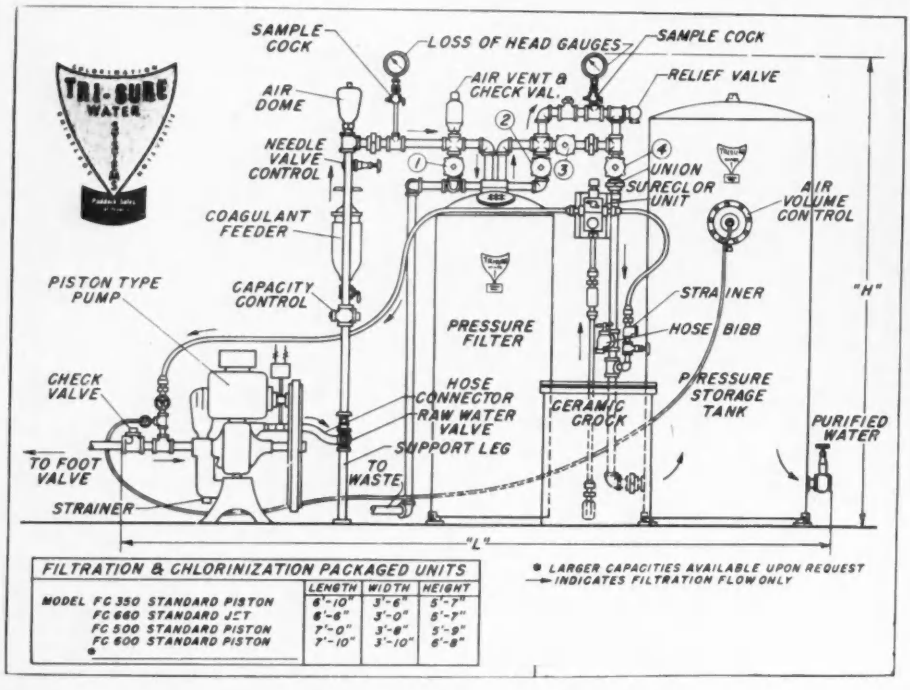
Not so anymore! If there's water present at all . . . and there is nearly always a swamp, river, pond or stream . . . there's a new way of making it pure and safe at low cost.

TRI-SURE WATER SYSTEMS, produced by Paddock Engineering Co. of Texas, Dallas, Texas, consist of a gasoline or electrically driven pump, alum feeder, filter, SURECLOR Automatic Water Chlorinating Unit (Chlorinator), and a pressure storage tank. It is a *packaged unit ready to install.* Merely drop a hose into the lake or swamp and start the pump. TRI-SURE automatically pumps, filters, and purifies the water.

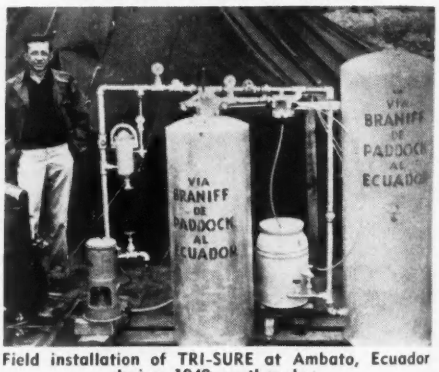


TYPICAL TRI-SURE INSTALLATION

TRI-SURE readily breaks down into three sections for easy transportation and quick assembly. Skid-mounted units available.



FOREIGN INSTALLATION



Field installation of TRI-SURE at Ambato, Ecuador during 1949 earthquakes.

PRESIDENCIA DE LA REPUBLICA

September 6, 1949

Mr. TOM E. COLLINS
4404 Caruth Street
Dallas, Texas

Dear Mr. Collins:

I don't know if you have heard that up to date we have had no epidemic outbreak in Ambato. This remarkable achievement is due, in no small part, to the Tri-Sure Water System donated by the Paddock Engineering Co. of Dallas, which was installed by you.

I just wanted to express my gratitude to the Paddock Engineering Co., Braniff Airways that brought the installation down, and to you for setting it up. You all did a great job that my country will not forget.

Sincerely,
Galo
GALO PLAZA

Letter of thanks from Galo Plaza, President of Ecuador.

ALSO REMOVES IRON AND SULPHUR

TRI-SURE readily removes these minerals, leaving the water clear and pure. Clean water is essential for cooling water systems.

TRI-SURE PREVENTS EPIDEMIC. When earthquakes laid to waste cities in Ecuador, a TRI-SURE was flown via Braniff Airways to Ambato. Water from a stream was pumped, filtered and chlorinated by TRI-SURE. For months, this unit served as the only water supply for the entire city. Not a single epidemic of typhoid, cholera, and other water borne diseases broke out. Only one of many foreign installations of TRI-SURE.

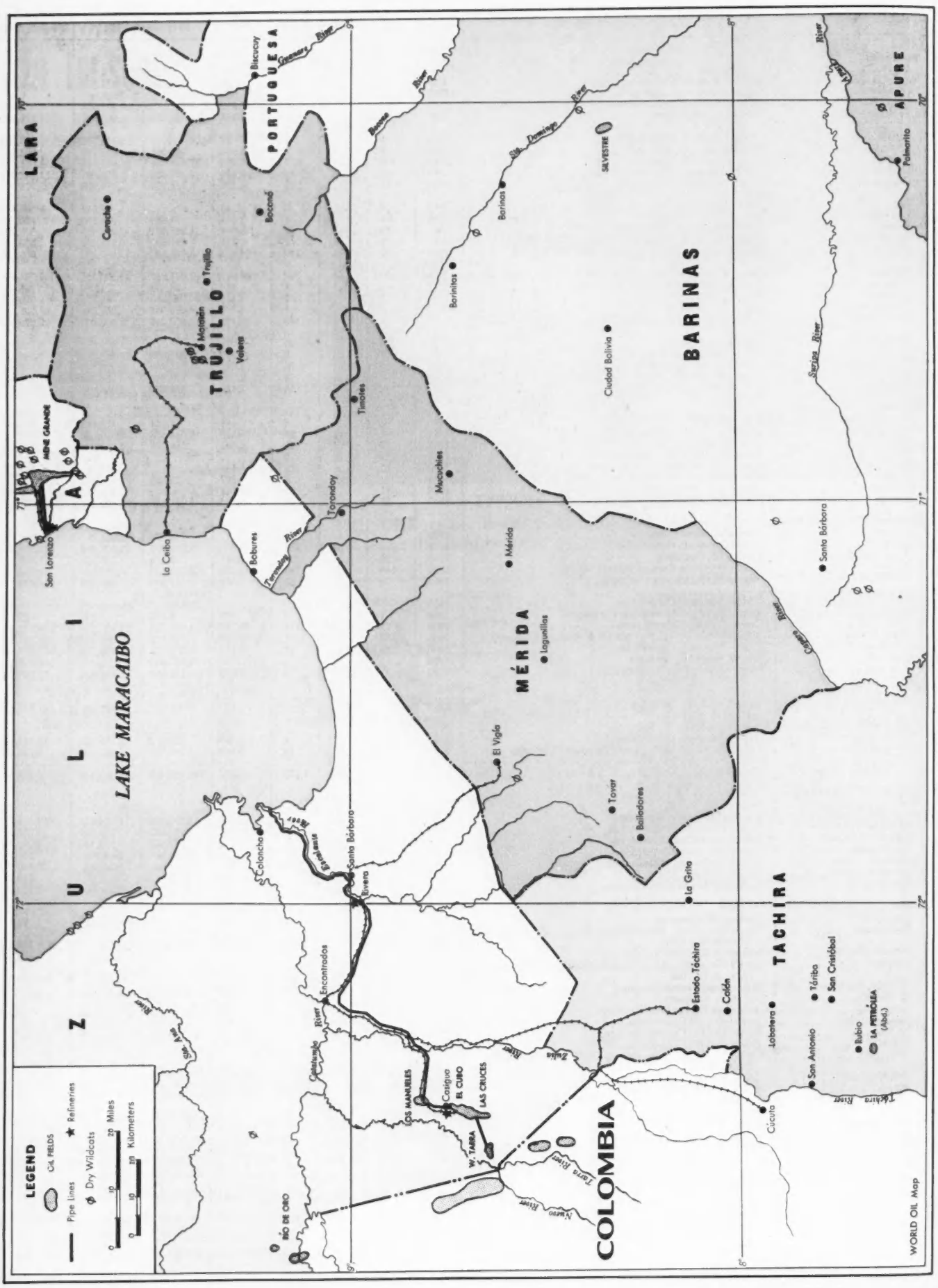
Dept. W. A. Paddock Sales of Texas, 3727 Atwell, Dallas, Texas **Cable Address: PECO**

VENEZUELA—Continued

Oil Production and Producing Wells in Venezuela

STATE and FIELD	OPERATING COMPANY	Year of Discovery	PRODUCING OIL WELLS END OF 1949			Daily at End 1949	CRUDE OIL PRODUCTION (Barrels)		
			Flowing	Art. Lift	Total		Year 1948	Year 1949	Cumulative Through 1949
EASTERN VENEZUELA:									
Anzoátegui:									
Anaco		....	....	....	....	16	.....	5,799	13,303
Caico Seco	Mene Grande Oil Company	1946	3	....	3	887	212,339	324,234	662,752
Capacho	Creole Petroleum Corporation	1945	....	....	....	.....	Shut in	Shut in	7,032
Chimiri	Creole Pet. Corp., Mene Grande, Socony-Vacuum Oil Co.	1948	46	....	46	17,511	221,678	6,393,084	6,614,223
El Roble	Pantepec Oil Company	1939	12	....	12	5,158	1,834,753	1,883,205	17,179,523
Freites	Creole Petroleum Corporation	1949	1	....	1	38	.....	13,762	13,762
Fria	Mene Grande Oil Company	1948	4	3	7	943	348,593	345,128	693,710
Guara	Mene Grande Oil Company	1942	103	24	127	67,564	27,886,876	24,661,819	134,055,873
Guario	Socony-Vacuum Oil Company	1940	22	....	22	6,246	2,347,005	2,279,991	11,543,719
Guico	Socony-Vacuum Oil Company	1944	35	....	35	12,290	6,187,190	4,484,808	25,073,097
Inca	Mene Grande Oil Company	1949	2	....	2	95	.....	34,543	34,543
La Ceiba	Mene Grande Oil Company	1946	1	....	1	151	73,660	54,268	230,260
Leona	Socony-Vacuum Oil Company	1940	20	3	23	5,604	1,940,921	2,044,593	10,693,213
Merey-Areo	Creole Petroleum Corporation, Mene Grande Oil Co.	1934	3	4	7	314	121,526	115,177	303,711
Nipa	Mene Grande Oil Co., Socony-Vacuum Oil Co.	1945	99	1	100	34,663	8,192,422	12,652,732	25,685,889
Oficina	Creole Petroleum Corp., Mene Grande Oil Co.	1933	109	84	193	40,619	16,071,953	14,826,257	153,358,692
Pelayo	Venezuelan Atlantic Refining Company	1947	3	....	3	314	59,842	114,982	192,905
Quiamare	Mene Grande Oil Company	1943	1	....	1	138	32,595	49,368	695,911
Rincon Largo	Texas Petroleum Company	1941	4	....	4	1,799	696,688	657,280	3,799,092
San Joaquin	Mene Grande Oil Company	1939	41	1	42	10,422	3,853,246	3,803,608	29,272,660
San Roque	Phillips Oil Company	1949	10	....	10	3,039	.....	1,109,088	1,109,088
Santa Ana	Mene Grande Oil Company	1936	7	....	7	2,516	391,670	918,579	2,534,133
Santa Rosa	Mene Grande Oil Company	1941	10	....	10	3,038	1,013,960	1,108,163	5,857,969
Toco	Mene Grande Oil Company	1948	4	....	4	2,069	373,844	756,204	1,130,039
Yopales	Mene Grande Oil Company	1937	12	6	18	3,440	569,687	1,255,657	2,786,777
Guárico:									
Guavinia	S. A. Petrolera Las Mercedes	1948	8	....	8	484	11,754	176,822	190,936
Las Mercedes	S. A. Petrolera Las Mercedes	1943	96	2	98	15,580	1,946,468	5,686,826	8,388,768
Palacio	S. A. Petrolera Las Mercedes	1947	37	1	38	5,051	586,298	1,842,844	2,430,740
Punzón	Texas Petroleum Company	1949	2	....	2	.....	.....	182	182
Ruiz	Venezuelan Atlantic Refining Company	1949	12	....	12	498	.....	181,772	181,772
Sabán	Venezuelan Atlantic Refining Company	1948	2	5	7	277	25,851	100,333	126,184
Tamán	Venezuelan Atlantic Refining Company	1949	11	....	11	2,144	.....	782,533	782,533
Tucupido	Venezuelan Atlantic Refining Company	1945	27	1	28	8,434	1,021,846	3,079,487	4,110,533
Monagas:									
Caritos	Texas Petroleum Company	1939	....	....	....	.....	8,221	Shut in	255,903
Jusepin	Creole Petroleum Corporation	1938	264	24	288	31,581	17,564,579	11,526,259	119,103,545
Mata Grande	Phillips Oil Company	1946	20	1	21	1,811	653,675	661,972	1,469,746
Mulata	Creole Petroleum Corp., Pantepec Oil Co.	1941	146	39	185	18,523	5,330,851	6,760,648	51,920,492
Muri	Sinclair Oil & Refining Company	1942	19	34	53	2,554	1,134,900	932,322	11,478,118
Orocual	Creole Petroleum Corporation	1933	....	....	....	.....	Abandoned	Abandoned	29,530
Pirital	Venezuelan Atlantic Refining Company	1944	1	....	1	25	8,753	8,240	87,527
Quiriquire	Creole Petroleum Corporation	1928	72	125	197	63,740	24,592,734	23,267,286	326,412,252
Santa Bárbera	Mene Grande Oil Co., Sinclair Oil & Refining Company	1941	157	47	204	19,190	5,473,124	7,005,235	61,237,123
Temblador	Creole Petroleum Corporation	1936	88	....	88	10,158	3,360,163	3,708,659	31,927,769
Travieso	Mene Grande Oil Company	1944	....	....	....	.....	4,621,407	.....	37,782,943
Travieso 2	Sinclair Oil & Refining Company	1944	....	9	9	340	151,601	124,284	850,493
Sucre:									
Guanoco	Texas Petroleum Company	1914	....	....	....	.....	Shut in	Shut in	1,718,918
Territorio Delta Amacuro:									
Pedernales	Creole Petroleum Corporation	1935	8	....	8	5,780	956,024	2,110,930	12,544,536
Tucupita	Creole Petroleum Corp., Texas Petroleum Company	1945	40	....	40	5,893	2,186,488	2,150,505	6,255,402
Eastern Totals		....	1,562	414	1,976	410,937	142,065,185	149,999,468	1,112,862,182
WESTERN VENEZUELA:									
Falcon:									
Cumarebo	Creole Petroleum Corporation	....	20	23	43	3,906	1,698,696	1,426,095	41,104,756
El Mene	British Controlled Oilfields, Ltd.	1921	....	26	26	365	143,985	133,939	24,832,302
Hombre Pintado	British Controlled Oilfields, Ltd.	1929	1	25	26	698	262,423	254,186	4,480,103
Las Palmas	Creole Petroleum Corporation	1929	....	....	....	.....	Shut in	Shut in	433,958
Media	British Controlled Oilfields, Ltd.	1928	....	....	....	.....	Shut in	Shut in	10,689,546
Mene de Acosta	Tocuyo Oilfields, Ltd.	1927	....	....	....	.....	Shut in	Shut in	778,067
Urumaco	Richmond Exploration Company	....	....	....	....	.....	Shut in	Shut in	1,289,841
Zulia:									
Amana	Guasare Oil Company	1943	3	....	3	99	.....	36,141	74,690
Bachaquero	Creole Pet. Corp., Mene Grande Oil Co., Venezuelan Oil Concessions, Ltd.	1938	466	106	572	83,840	40,585,710	30,613,410	158,666,413
Boscan-Albaricos	Richmond Exploration Company	1947	1	43	44	3,515	271,800	1,282,979	1,554,795
Cabimas	Creole Pet. Corp., Mene Grande Oil Co., Venezuelan Oil Concessions, Ltd.	1917	153	737	890	65,157	30,018,982	23,782,400	610,369,055
El Cubo, Las Cruces	Colon Development Company	....	24	109	133	12,227	2,595,756	4,462,743	113,347,860
El Menito	California Company	1924	....	....	....	.....	6,670	.....	6,705
Ensenada	Richmond Exploration Company	1948	1	....	1	77	761	28,002	28,763
La Concepción	Venezuelan Oil Concessions, Ltd.	1925	1	78	79	3,807	1,148,862	1,389,439	33,825,522
La Paz	Venezuelan Oil Concessions, Ltd.	1922	23	29	52	135,169	43,691,926	49,336,677	154,987,385
Lacustre	Venezuelan Oil Concessions, Ltd.	1949	1	....	1	.....	.....	.....	.....
Lagunillas	Creole Pet. Corp., Mene Grande Oil Co., Venezuelan Oil Concessions, Ltd.	1926	225	1,095	1,320	343,665	126,076,540	125,437,695	1,768,865,715
Los Manueles	Colon Development Company	1927	....	....	....	.....	1,049,927	.....	251,819,555
Macoa	Richmond Exploration Company	1949	4	....	4	37	.....	13,554	13,554
Mara	Creole Pet. Corp., Mene Grande Oil Co., Shell Caribbean Pet. Co., Texas Pet. Company	1945	27	....	27	.....	15,611,299	.....	29,183,636
Mene Grande	Shell Caribbean Petroleum Company	1913	5	318	323	47,179	16,338,415	17,220,507	338,393,276
Netick	Mene Grande Oil Company	1943	2	2	4	215	104,744	78,546	702,289
Pueblo Viejo	Mene Grande Oil Co., Venezuelan Oil Concessions, Ltd.	1940	11	6	17	2,790	3,135,451	1,018,799	9,271,074
Río de Oro	Colon Development Company	1916	....	....	....	.....	Shut in	Shut in	24,360
Río Palamar (Totumo)	Creole Petroleum Corporation	1915	....	....	....	.....	Abandoned	Abandoned	24,259
San José	Richmond Exploration Company	1948	....	....	....	.....	7,435	.....	7,435
Sibucara	Venezuelan Oil Concessions, Ltd.	1948	1	....	1	6,462	94,548	2,358,606	2,453,153
Tía Juana	Creole Pet. Corp., Mene Grande Oil Co., Venezuelan Oil Concessions, Ltd.	1928	177	517	694	132,337	66,331,576	48,303,261	601,935,662
West Tarra	Colon Development Company	1927	....	....	....	.....	511,896	.....	5,120,810
Western Totals		....	1,145	3,114	4,259	841,545	349,687,402	307,176,979	4,164,284,539
TOTAL VENEZUELA		....	2,708	3,528	6,236	1,252,482	471,519,881	457,176,447	5,210,145,781

VENEZUELA—Southwestern Fields



VENEZUELA—Continued

other goods from the U. S. and other countries. Because Venezuela's economy is centered on oil, the stability of the industry is of prime importance to all the free countries of the world.

Construction of a 35,000 barrel capacity refinery at Bajo Grande, near Lake Maracaibo, was postponed by Richmond Exploration last year as a result of the decreased demand for the heavy crude from the Boscan field.

Engineering and Geological Data on Venezuela Fields

STATE and FIELD	Proven Area (Acres)	Gravity of Oil (API)	Name	Kind	Age	DEPTH, (Feet) Minimum Top of Pay	DEPTH, (Feet) Maximum to Bottom of Pay	Type Structure
EASTERN VENEZUELA:								
Anzoategui:								
B-1	....	40	Oficina	Sand	Miocene	7740	8500	Faulted Monocline
Caico Seco	200	....	Oficina	Sand	Miocene	7140	8500	Faulted Monocline
Caris	....	....	Oficina	Sand	Miocene	....	8301	Faulted Monocline
Chimire	....	....	Oficina	Sand	Miocene	....	6900	Faulted Monocline
El Roble	9100	44	Oficina, Merecure	Sand	Miocene, Eocene	7800	10500	Anticline
Guara	3350	15–37	Oficina	Fine sand	Miocene	5200	6560	Faulted Monocline
Guario	4000	38–45	Oficina	Sand	Miocene	4200	8000	Faulted Monocline
Guico	2650	38	Oficina	Fine sand	Miocene	5200	7000	Faulted Monocline
Inca	....	37.8	Oficina	Sand	Miocene	6824	6831	Faulted Monocline
La Ceiba	150	37.3	.....	Sand	Miocene	5400	7000	Faulted Monocline
Leona	1100	26	Oficina	Lutitas	Miocene	6000	7000	Faulted Monocline
Nipa	1050	33–38	Oficina	Fine sand	Miocene	7100	7600	Faulted Monocline
Oficina	13500	25	Oficina	Fine sand	Miocene	4590	5900	Faulted Monocline
Pelayo	250	30.2	Oficina	Sand	Miocene	7480	8005	Faulted Monocline
Quiamare	50	39	.....	Sand	Miocene	....	6400	Faulted Monocline
Rincón	300	42	Oficina	Sand	Miocene	7730	9000	Faulted Monocline
San Joaquín	7692	43	Oficina, Merecure	Clay, sand	Miocene, Eocene	6230	6560	Anticline
San Roque	....	45	Oficina	Sand	Miocene	7640	7870	.....
Santa Ana	250	34.6	Oficina, Merecure	Sand	Miocene, Eocene	4500	8840	Anticline
Santa Rosa	1670	42	Oficina, Merecure	Fine sand	Miocene, Eocene	7546	10400	Anticline
Tocó	....	....	Oficina, Merecure	Sand	Miocene, Eocene	....	7950	Anticline
Yopales	900	16–42	Oficina	Sand	Miocene	4340	5900	Faulted Monocline
Guarico:								
Guavinita	....	....	La Pascua	Sand	Mio.-Olig.	....	4001	Monocline
Las Mercedes-Grico	7000	32	La Pascua	Sand	Mio.-Olig.-Cret.	4200	6400	Faulted Monocline
Palacio	1000	34	La Pascua	Sand	Miocene	3500	4500	Faulted Monocline
Punzon	....	....	La Pascua	Sand	Mio.-Olig.	3480	....	.....
Ruiz	....	29	.....	Sand	.....	4410	4450	.....
Sabán	....	36	.....	Sand	Mio.-Olig.	....	5718	.....
Taman	....	39	.....	Sand	Miocene	2970	5640	.....
Tucupido	500	36	Tucupido	Sand	Miocene	....	6858	Anticline
Monagas:								
Caritos	200	30.5	Oficina	Sand	Miocene	5650	....	.....
Jusepín	17000	33	Jusepín	Fine sand	Miocene	4590	4670	Anticline
JX6	....	12.6	.....	Lime	Cretaceous	....	2546	Monocline
Mata Grande (Filven)	300	25	.....	Fine sand	Miocene	5700	6100	Monocline
Mulata	7240	33	Mulata	Fine sand	Miocene	5240	5900	Strat.-trap
Muri	800	32	Muri	Loose sand	Miocene	3280	3600	Monocline
Piritál	50	28	.....	Sand	Miocene	5870	5925	Strat.-trap
Quiriquire	12250	19	Quiriquire	Clay, sand	Pliocene	2624	4900	Faulted Monocline
Santa Bárbara	2315	27–30	S. Bárbara	Fine sand	Miocene	5900	6560	Monocline
Temblador	4600	21	Oficina	Fine sand	Miocene	3600	3930	Fault
Travieso	2500	33	La Pica	Sand	Miocene	5500	6450	Anticline
Travieso 2	500	31	.....	Fine sand	Miocene	5600	6200	Monocline
Terr. Delta Amacuro:								
Pedernales	972	21	Pedernales	Loose sand	Miocene	1550	2500	Anticline
Tucupita	600	16.5	.....	Loose sand	Miocene	5550	6000	Anticline
WESTERN VENEZUELA:								
Barinas:								
Silvestre	....	26	.....	Sand	Eocene	8600	9763	Anticline
Falcón:								
Cumarebo	540	48	Socorro	Lent. sand	Miocene	1950	3000	Anticline
El Mene	1008	33	Agua Clara	Sandstone	Miocene	1120	1600	Anticline
Hombre Pintado	92	24	Agua Clara	Sandstone	Miocene	2460	2630	Anticline
Las Palmas	50	34	Monte Claro	Sand	Oligocene	2750	....	Anticline
Media	62	34	Agua Clara	Sandstone	Miocene	3280	3900	Fault
Mene de Acosta	....	...	El Salto	Sand	Oligocene	970	2046	Anticline
Zulia:								
Amana	500	31.5	.....	Sand	Eocene	3188	4500	Anticline
Bachaquero	19000	13–17	Lagunillas Icotea	Clay, sand	Mio.-Olig.	2800	6000	Monocline
		14	Lagunillas Icotea	Clay, sand	Mio.-Olig.	2800	6000	Monocline
Boscán	....	10–12	.....	Sandstone	Olig.-Eoc.	....	9982	Anticline
Cabimas	4500	15–27	Lagunillas Icotea	Clay, sand	Mio.-Olig.	1600	3600	Monocline
Concepción	2470	37	Concepción	Sandstone	Eocene	1700	....	Anticline
El Cubo, Las Cruces, Tarra	2470	19–33	Mirador	Sandstone	Eocene	2300	6350	Monocline
La Paz	1359	24–34	La Paz, La Luna, Cogollo	Sandstone, Limestone	Eoc.-Cret.	1900	2950	Anticline
Lagunillas	60000	16–30	Lagunillas Icotea	Clay, sand	Mio.-Olig.	2500	5500	Monocline
		11–18	Lagunillas Icotea	Clay, sand	Mio.-Olig.	2500	5500	Monocline
Las Manueles	420	30–39	Mirador	Sandstone	Eocene	3900	....	Dome
Mara	1500	29.5	Cogollo	Limestone	Cretaceous	6400	7000	Anticline
Mene Grande	8645	22	Pauji	Clay, sand	Eocene	3050	4550	Anticline
Netick	250	29.2	Mostrencos	Sand	Eocene	5860	6097	Faulted Anticline
Pueblo Viejo	3750	21	.....	Sand	Eocene	1850	3000	Anticlin
Río de Oro	100	38.8	Río de Oro	Sand, lime	Cretaceous	....	1850	Fault
Sibucara	....	36.6	Cogollo	Limestone	Cretaceous	12200	13451	Anticline
Tía Juana	43000	13	Lagunillas, El Mene	Clay, sand	Miocene, Eocene	2850	5000	Monocline
W. Tarra	500	41	.....	Limestone	Cretaceous	6900	8400	Anticline

ACCURACY

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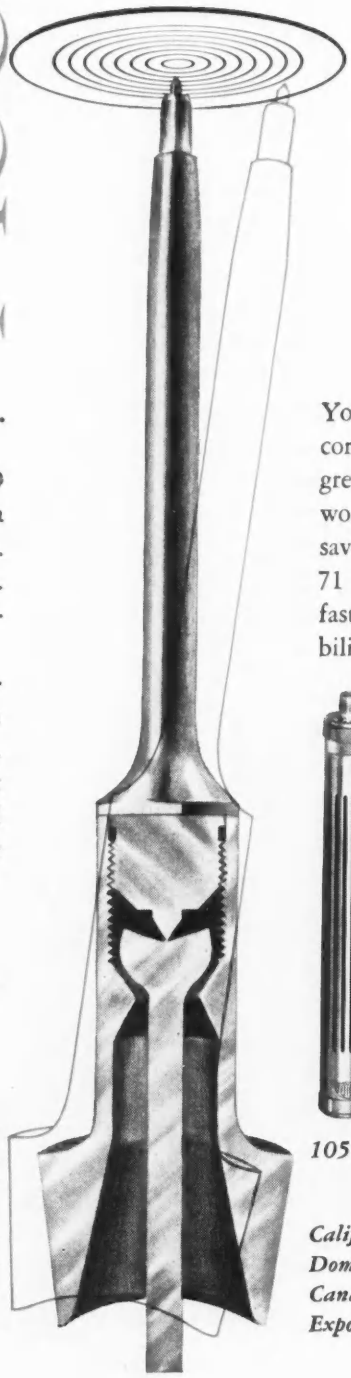

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ALBANIA

LITTLE is known of Albania's oil production and activities other than the fact that production comes from the Devoli field and other small fields at Pahtoso. No new discoveries have been reported and the oil production from the country for 1949 is estimated to be about 1,250,000 barrels. Russia has been extremely lenient with the little satellite and reportedly does not interfere in the country's oil activities.

The country has a small refinery at Berat which is connected to the Devoli field by an eight-inch, 46-mile pipe line. Another pipe line was built in 1949 from the Pahtoso fields to Vlora 20 miles east on the coast. Albania did export some of her petroleum products to Yugoslavia in 1945 and 1946 but this trade has probably been suspended in view of the latter country's secession from the Russian bloc.

AUSTRIA

ALL of Austria's oil fields and active refineries are in the Soviet zone of occupation and information regarding production is as sketchy and as subject to conjecture as petroleum activities in other Russian dominated areas.

Discussions of a peace treaty with Austria have been under way for more than 2½ years with Russia balking at every suggestion the Western Powers submit to expedite the signing of a pact. The Western Powers have agreed to Russian demands that she be given 60 percent of all producing oil fields, crude oil refineries, and the most promising exploratory prospects in eastern Austria as well as a substantial share of the distribution networks in that area.

Drilling activities during 1949 were apparently confined to the Matzen area 18 miles northeast of Vienna where Russian operators reportedly drilled five wells with no reliable results of the work available.

A report early in 1950 stated that the reserves developed in the Matzen field would normally last about 30 years, but under the mismanagement of the Russians the field may be depleted in 8 to 10 years.

Refineries of Austria

COMPANY	Loaction of Plant	Total Charging Capacity Barrels Daily	Type of Refinery
SOVIET ZONE:			
*Aktiengesellschaft der Kohlen wertstoffverbaende Gruppe *Bezin-Benzol Verband (BV)*	Vösendorf (Vienna)	2,500	Skim, lube, asphalt
Aktiengesellschaft de Shell-Floridsdorfer Mineralölfabrik (Shell)	Floridsdorf (Vienna)	2,800	Skim, lube, asphalt
*Donau Oel Gesellschaft m.b.H.	Moosbierbaum (near Tulln)	3,500	Skim, lube, asphalt
*Korneuburger Mineralölraffinerie Aktiengesellschaft	Korneuburg (Vienna)	5,600	Skim, lube, asphalt
*"NOVA," Mineralölraffinerie Aktiengesellschaft	Schwechat (Vienna)	3,500	Skim, crack, lube, asphalt
*Oesterreichische Mineralölwerke Gesellschaft m.b.H. (Shell-Scony-Vacuum)	Lobau (Vienna)	5,600	Skimming
Vacuum Oil Co., Aktiengesellschaft (Socony-Vacuum)	Karan (Vienna)	2,500	Skim, lube, asphalt
U. S. ZONE:			
Deutsche Erdölwerke	Ebensee (near Linz)	2,200	Skimming

* Soviet claimed and operated.

Oil Production and Producing Wells in Austria

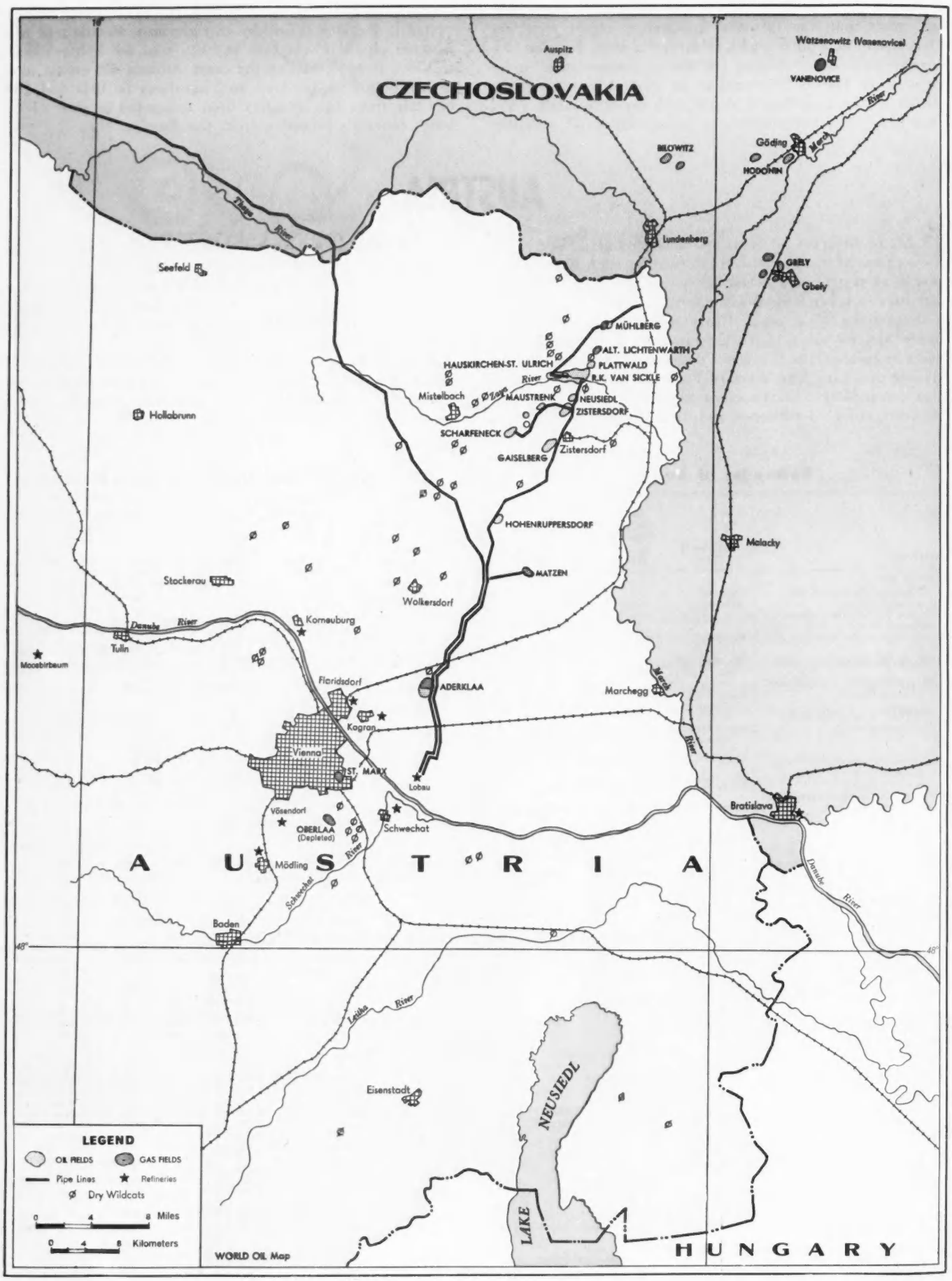
REGION and FIELD	Operating Company	Year of Discovery	Producing Wells	CRUDE OIL PRODUCTION (Barrels) Year 1948	Year 1949	Cumulative Through 1949
LOWER DANUBE						
Aderklaa	S.M.O.A.*	1942	4	.....	.....	22,000
Gaiselberg	Rohoelgew, A.G.	1938	60	1,047,160	977,472[1]	12,081,632
Hohenruppersdorf	S.M.O.A.	1941	5	14,480	.....	78,480
Maustrenk	S.M.O.A.	1941	44	76,390	322,091[1]	1,464,481
Mühlberg	S.M.O.A.	1942	24	1,819,510	3,666,878[1]	8,416,388
Neusiedl	S.M.O.A.	1936	4	.....	.....	153,000
Scharfeneck	S.M.O.A.	1944	2	260	.....	21,260
St. Ulrich-Hauskirchen	S.M.O.A. & R.V. Van Sickle	1938	351	1,531,250	1,466,208[1]	20,601,458
Van Sickle	S.M.O.A.	1939	52	369,920	364,855[1]	5,663,775
Zisterdorf (Rag and Gösting)	Rohelgew. A.G & Erdölproduktions G.m.b.H.	1930	91	851,340	854,949[1]	12,089,953
UPPER DANUBE						
Leoprechting	"Pram" Erdölexplorations G.m.b.H.	1906	10	600	.....	2,600
Total	.....	....	647	5,710,910	7,652,453[1]	60,595,027

* Soviet Mineral Oil Administration. [1] Estimated.

Engineering and Geological Data on Austria Fields

REGION and FIELD	Proved Area (Acres)	Range of Gravity (API)	Name	Kind	Age	DEPTH (Ft.) Minimum to Top of Pay	Maximum to Bottom of Pay	Average Thickness of Pay (Ft.)	Type of Structure
LOWER DANUBE:									
Aderklaa	....	48.8-gas	Helvet-Schlier	Sand	Miocene	7,977	8,535	85	Buried Hill
Alt.-Lichtenwarth	....	Gas	Sarmat-Torton	Sand	Miocene	2,886	3,644	115	Fault structure
Gaiselberg	200	21.5-27.5	Sarmat-Torton	Sand	Miocene	2,066	7,724	387	Fault structure
Hohenruppersdorf	....	35.0	Sarmat-Torton (Flysch)	Sand, Sandstone	Miocene (Cret.)	3,323	5,366	98	Fault structure
Matzen	....	23.8	Sarmat	Sand	Miocene	n. a.	n. a.	n. a.	Anticline
Maustrenk	200	26.5	Helvet-Schlier (Flysch)	Sand, Sandstone	Miocene (Eoc.)	2,756	3,297	164	Stratigr. trap
Mühlberg	....	30.5	Pannon, Sarmat-Torton	Sand	Miocene	1,490	5,315	476	Fault structure
Neusiedl	....	31.5	Flysch	Sandstone	Eocene	4,003	4,101	20	Anticline
Oberlaa	....	Gas	Torton	Sand-conglomerate	Miocene	820	873	13	Buried Hill
Plattwald	....	21.5	Torton	Sand	Miocene	3,255	5,190	56	Fault structure
Scharfeneck	....	24.0	Helvet-Schlier	Sand	Miocene	3,251	3,317	66	Stratigr. trap
St. Marx	....	Gas	Torton	Sand	Miocene	2,343	2,395	52	Fault Anticline
St. Ulrich-Hauskirchen	2000	31.5	Helvet-Schlier (Flysch)	Sand, Sandstone	Miocene, (Eoc.)	2,723	3,773	394	Buried Hill and Anticline
Van Sickle	....	21.5-27.5	Sarmat-Torton	Sand	Miocene	1,312	4,593	459	Fault structure
Zistersdorf	100	20.7-27.5	Sarmat, Torton, Flysch	Sand, Sandstone	Miocene	2,165	7,720	518	Fault structure
UPPER DANUBE:									
Leoprechting	....	12.9	Burdigal-Schlier	Sand	Miocene	394	472	33	Stratigr. trap
Wels	....	Gas	Burdigal, Helvet-Schlier	Sand	Miocene	476	1,499	33	Stratigr. trap

AUSTRIA and CZECHOSLOVAKIA—Vienna Basin Fields



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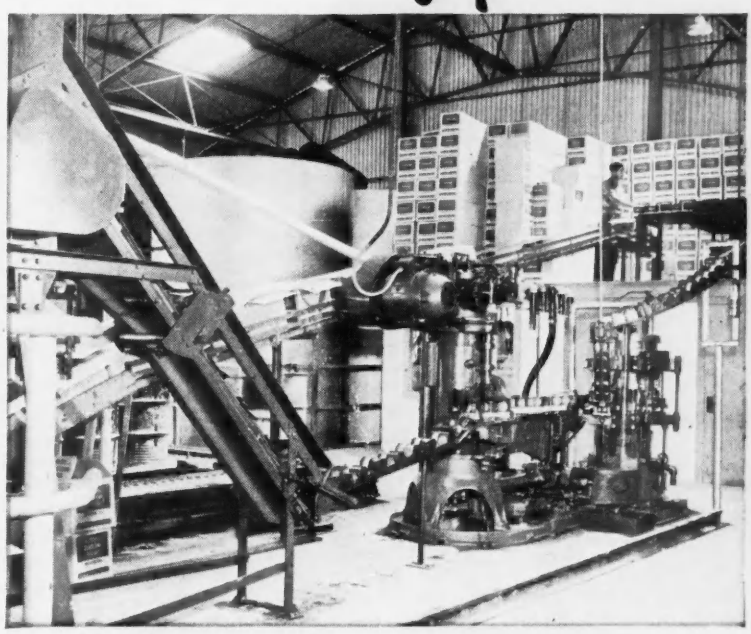

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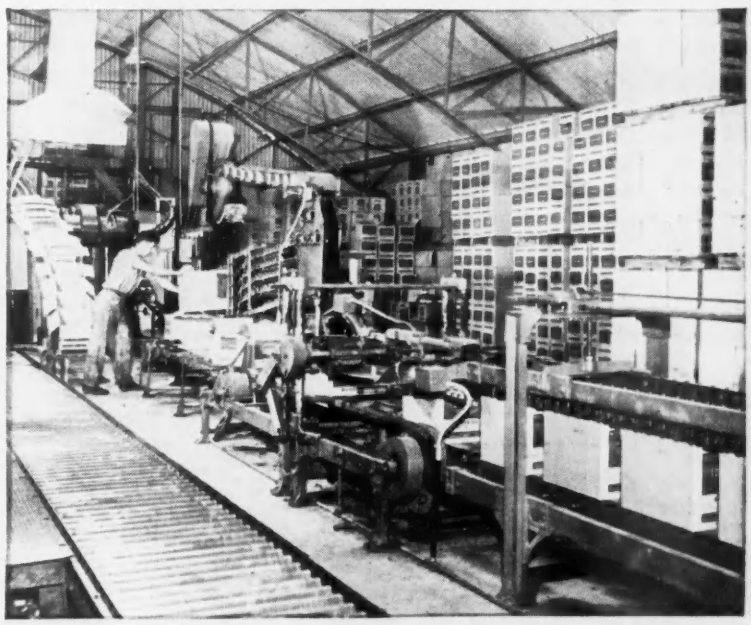

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CZECHOSLOVAKIA

THE nationalized petroleum industry in Czechoslovakia, controlled by the Central Direction of the Czechoslovakian Mining Industry, had set a goal for 1949 production of about 600,000 barrels of oil, but it is now thought the country did not reach half of that goal during the year. When the country disappeared behind the Iron Curtain it was thought that nationalization of the petroleum industry would increase efficiency of operation but as is usually the case the reverse was true. Positions in the organization were filled on the basis of political belief rather than technical knowledge.

Drilling continues in the Hodonin-Gbely area with some wells attaining depths of 3000 feet or more, but wildcatting was still in the planning stage in South Morovia, East Slovakia, and the Carpathian Mountains, which have been considered good potential oil areas. Motor fuel is supplied to some extent from natural gas wells in Southeastern Morovia and West Slovakia, which are connected to a network of methane-gas filling stations in the area. The production of oil from coal is being attempted at Brux but the cost has so far been prohibitive.

DENMARK

DENMARK'S one reported drilling well, the Gassum 1, 26 miles northwest of Aarhus, was shut down at 9955 feet with no reported shows of oil or gas. The well was originally scheduled to go below 10,000 feet and drilling will probably continue. The work is being done by the Danish American Prospecting Company (Gulf Oil Corporation).

Gulf recently agreed to limited participation in its exploratory work by the Danish government. With this agreement Gulf's concession was extended 50 years and the government is to receive 5 percent of the share capital of the enterprise. When discussions of the agreement first started Gulf suspended its field operations and now that a settlement has been made work will be resumed.

Denmark fills her oil requirements of 25,000 barrels a day chiefly from imports from France and Britain in line with her recent shift to purchases from non-dollar areas. These two countries now supply about 60 percent of Denmark's needs, with the Netherlands West Indies and the U. S. furnishing the remainder.

Denmark's 400-barrel-a-day refinery may be supplemented by a 14,000-barrel refinery which is still in the planning stage. Final approval of the $8 million plant depends upon the government's reaction to the plan.

FRANCE

CRUDE production in France was increased from 362,400 barrels in 1948 to 464,775 barrels in 1949. The increase came from the Pechelbronn field in the Alsace Basin near the German border and was largely due to the drilling of 24 successful producers in the field proper. France has an aggressive exploratory program with 25 rigs in operation in the Aquitaine and Languedoc basins of the Southern area besides those continually developing the Alsatian area; however, the country is still far from supplying her own needs.

Exploratory drilling during the year developed some encouraging results with 2 wildcats finding oil in the Alsace basin, 1 in the Aquitaine, and 3 in the Languedoc basin. The new discovery in the Alsace basin near Soultz has tentatively been named after the village. The first well was reported to have an output of about 500 barrels a day, while the second reportedly made about 750 barrels a day. These discoveries in the Muschelkalk limestone were augmented by deep production found within the Pechelbronn field with one well flowing 900 barrels a day. In addition to the exploratory work, the older Pechelbronn wells have generally recovered from their war damage and are again producing at their normal rates.

At Lacq near the railway from Pau to Bayonne a wildcat flowed 65 barrels a day from 2300 feet on initial test. This well was drilled on the basis of seismic work in the Pyrenees basin, south of France. Drilling continues in the area with three wells having reached 4500, 2100, and 10,500 feet at the end of 1949.

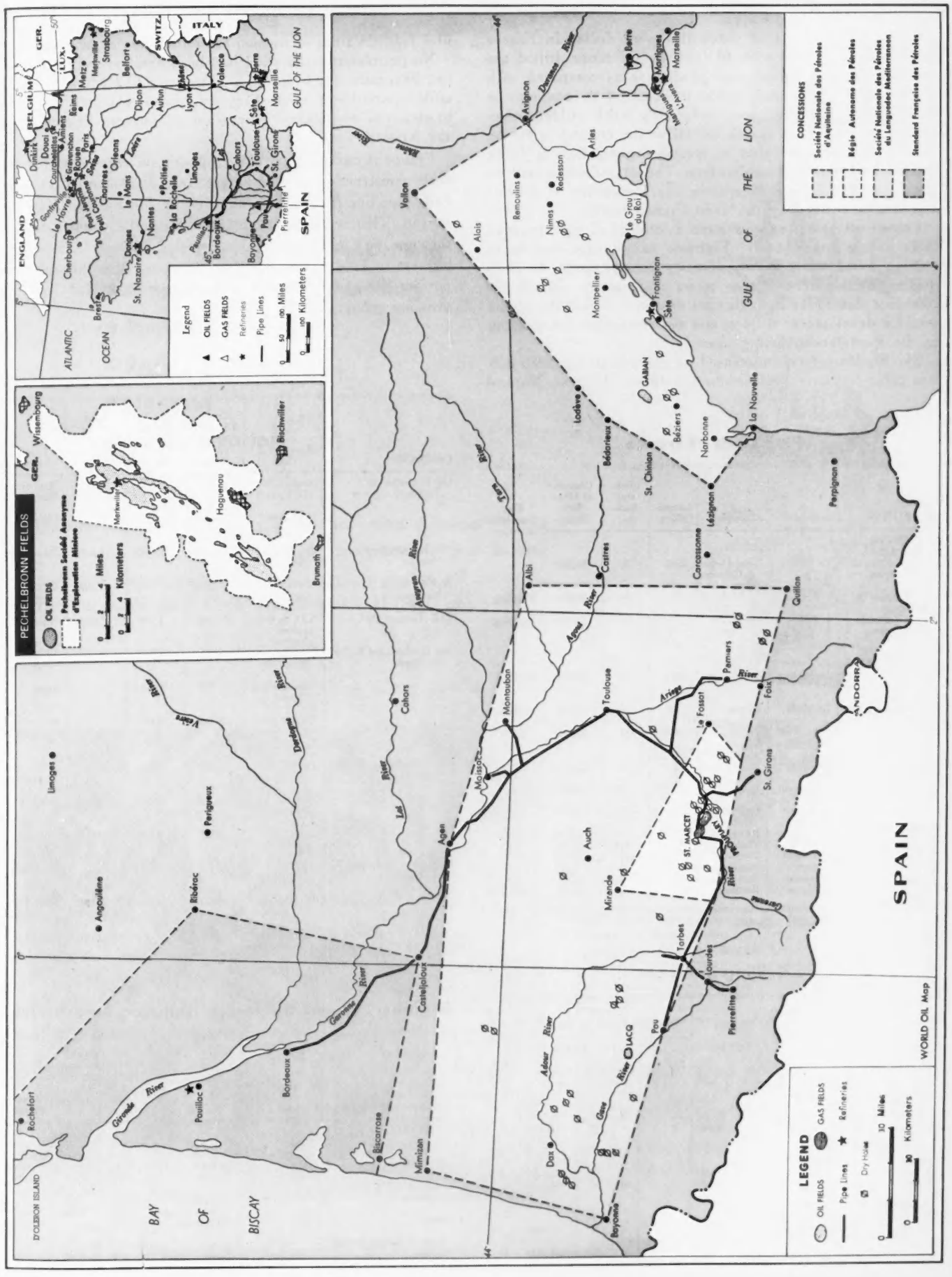
In an area west of the Rhone Valley two deep tests were drilled during the year. One at 11,000 feet is still drilling and

Oil Production and Producing Wells in France

PROVINCE and FIELD	Operating Company	Year of Discovery	PRODUCING WELLS END OF 1949			Gravity of Oil (API)	OIL AND GAS PRODUCTION			
			Flowing	Art. Lift	Total		Daily at End 1949	Year 1948	Year 1949	Cumulative Through 1949
BAS-RHIN:										
Péchelbronn	Péchelbronn Société Anonyme d'Exploitation Minères	1813	3	688	691	32	1,275	350,000	461,000	19,811,000
HAUTE GARONNE:										
St. Marcet:										
Oil Area	Régie Autonome des Pétroles	1939	2	....	2	45	....	12,400	2,800[2]	48,800[2]
Gas Area			13	....	13	Gas	30[1]	6,200[1]	8,450[1]	32,750[1]
HERAULT:										
Gabian	Société Nationale des Pétroles du Languedoc Méditerranéen	1924	....	....	....	....	....	.....	.....	187,330
PYRENEES:										
Lacq	Société Nationale des Pétroles d'Aquitaine	1949	1	....	1	....	65	.....	975[3]	975[3]
Total (Oil Only)		....	6	688	694	..	1,340	362,400	464,775	20,048,105

[1] Gas—Millions of Cubic Feet. [2] Produced Oil only first 3 months of 1949. [3] World Oil Estimate.

FRANCE


PECHELBRONN FIELDS
OIL FIELDS
Pechelbronn Société Anonyme d'Exploration Minière
Miles
Kilometers
Wissembourg
Bischwiller
Brumath
Hagenau
Markwiller
Legend
OIL FIELDS
GAS FIELDS
Refineries
Pipe Lines
Miles
Kilometers
ENGLAND
BELGIUM
GER.
LUX.
SWITZ.
ITALY
SPAIN
ATLANTIC OCEAN
GULF OF THE LION
BAY OF BISCAY
D'OLERON ISLAND
CONCESSIONS
Société Nationale des Pétroles d'Aquitaine
Régie Autonome des Pétroles
Société Nationale des Pétroles du Languedoc Méditerranéen
Standard Française des Pétroles
LEGEND
OIL FIELDS
GAS FIELDS
Pipe Lines
Refineries
Dry Holes
Miles
Kilometers
WORLD OIL Map

the other was completed at 11,400 feet with only shows of gas reported in the Jurassic.

Eighty-five wells of all categories were drilled in France in 1949 as compared with 63 in 1948. Of those drilled the past year 35 percent were oil productive as compared with 22 percent in 1948. This trend is expected to continue as France expands her seismic exploratory work. Added impetus was given to the search for oil in the country with the recent announcement that a special organization is being formed to finance oil exploration. The organization will be known as the Societe Financiere des Recherdes de Petrole and will be formed by the main French banks.

French oil operators now have a total of 51 rigs, most of them in use continuously. Eighteen heavy rigs capable of drilling to 12,000 feet are presently concentrating on deep drilling in Southern France along with seven rigs of the 7000-foot class. Five light rigs are centered around the Soultz area for development drilling and the remainder are working in the Pechelbronn field proper.

The St. Marcet field increased its gas production 2250 million cubic feet over 1948 production during the year. Natural gasoline extraction amounted to 103,950 barrels for the year. It was handled by the old gasoline plant at Peyrouzet and a new plant in Boussens which came into service in March.

No petroleum exploration had been commenced by Standard Francaise des Petroles, a Standard Oil Company (N.J.) affiliate, according to latest reports, but the company expected to obtain an exploration concession in Southern France along the Atlantic Coast.

France is currently putting emphasis on arguments for the early construction of the 30-inch Iraq Petroleum Company, Ltd., pipe line from the Kirkuk field to the Eastern Mediterranean. This is an important issue with the country which, through the Cie. Francaise des Petroles, holds a 23.75 percent interest in Iraq Petroleum Company, and it is the only important nationally controlled source of crude for France's growing refinery industry.

Pipe Lines of France

COMPANY	Origin	Terminus	Length (Miles)	Diameter (Inches)	Capacity of Lines (Bbls. Daily)	Year Completed
CRUDE OIL LINES:						
Standard Française des Pétroles	Le Havre	Notre-Dame-de-Gravenchon	22.5	10	55,000	.....
Cie. Française de Raffinage	L'Avéra	La Mède	7	16	90,000	Building
Cie. de Raffinage Shell-Berre	L'Avéra	Berre	20	14	70,000	Building
REFINED PRODUCT LINES:						
Société de Transport de Pétrole par Canalisation	Le Havre	Paris	160	10	20,000	Planned
Cie. Française de Raffinage	La Mède	Caronte	5.5	12	45,000	Planned
			5.5	8	45,000	Planned
GAS PIPE LINES:*						
Régie Autonome des Pétrolas	St. Marcet field	Peyrouzet	3	8	24,700	1942
	St. Marcet field	Boussens	10	9½	70,000	1947
	Peyrouzet	Pau via Tarbes	75	5	8,500	1946
	Tarbes	Pierrefitte	22	4	2,000	1946
	Boussens	Toulouse	37	12½	42,500	1947
	Peyrouzet	Toulouse	46	6	14,000	1942
	Capens	Pamiers	34	5	3,500	1947
	Boussens	St. Girons	22	4	6,350	1946
	Toulouse	Bordeaux	155	8	12.000	1948–1949

* Capacity in thousands of cubic feet.

Refineries of France

COMPANY	Location of Plant	Crude Charging Capacity (Bbls. Daily)	Cracking Capacity (Bbls. Daily)	Daily Crude Runs End of 1948 (Bbls.)	Type of Refinery
Cie Française de Raffinage	Gonfreville (Le Havre)	50,000	13,500	35,000	Skimming Wax
	Martigues (Marseille)	35,000	6,400	30,000	Skim-Crk. Asphalt
Cie. Industrielle des Pétroles	Frontignan (Sète)	8,000	2,700	6,000	Skimming
Pechelbronn S. A. d'Exp. Minières	Merkwiller (Strasbourg)	1,500	250	1,000	Skim-Lub Asphalt
Raff. Vacuum Oil Co....	N.D. de Gravenchon (Rouen)	16,000	1,400	14,000	Skimming
Sté. Générale des Huiles de Pétrole	L'Avéra (Marseillé)	25,000	7,500	23,000	Skimming
	Courchelettes (Douai)	750	None	.....	Lube
	Dunkerque	26,000	6,000	.....	Skim-Crk. Asphalt Wax
Cie. de Raffinage Shell-Berre	Petit-Couronne (Rouen)	35,000	2,900	30,000	Skim-Lube Asphalt
	Pauillac (Bordeaux)	5,000	None	4,500	Asphalt
	Berre (Marseillé)	25.000	7,500	20,000	Complete
Raffineries de Pétrole de la Gironde	Ambès (Bordeaux)	14,000	3,000	.....	Skimming
Standard Française des Pétroles	Port-Jérôme (Le Harve)	45,000	6,000	35,000	Skim-Lube Asphalt
Raffineries Françaises de Pétrole de L'Atlantique	Donges (St. Nazaire)	15,000	600	11,000	Skim-Lube

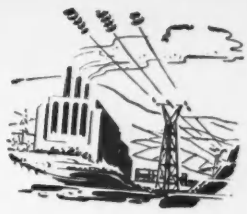
Drilling in France

REGION and FIELD	WELLS COMPLETED IN 1948					WELLS COMPLETED IN 1949					Wells Drilling End of 1949
				TOTAL					TOTAL		
	Oil	Gas	Dry	Wells	Footage	Oil	Gas	Dry	Wells	Footage	
ALSACE BASIN:											
Péchelbronn....	10	..	8	18	52,600	24	..	28	52	120,500	16
Wildcats.....	3	..	19	22	45,000	2	..	3	5	11,100	..
AQUITAINE BASIN:											
St. Marcet....	1	1	..	2	14,000	..	3	..	3	25,200	1
Wildcats.....	..	..	16	16	100,250	1	..	14	15	61,300	..
LANGUEDOC BASIN:											
Wildcats.....	..	..	5	5	23,000	3	..	7	10	38,100	..
Total.....	14	1	48	63	234,850	30	3	52	85	256,200	17

Engineering and Geological Data on French Fields

REGION and FIELD	Kind	Age	DEPTH (Ft.) Minimum to Top of Pay	DEPTH (Ft.) Maximum to Bottom Pay	Type of Structure
ALSACE BASIN:					
Péchelbronn.....	Sand	Oligocene	600	1200	Faults
	Dolomite	Oligocene	800	1600	Faults
	Sand	Jurassic	1300	2300	Faults
	Sand	Triassic	2900	4000	Faults
AQUITAINE BASIN:					
St. Marcet.....	Conglomerate	Cretaceous	4000	6000	.....
	Lime	Jurassic & Liassic	5000	7000	Anticline
Lacq.....	Lime	Cretaceous	2100	....	Anticline
LANGUEDOC BASIN:					
Gabian.....	Dolomite	Lower Triassic	205	1200	Faulted Anticline

Electrical Apparatus
FOR EVERY INDUSTRY



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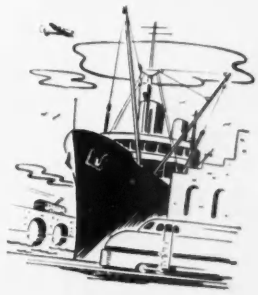

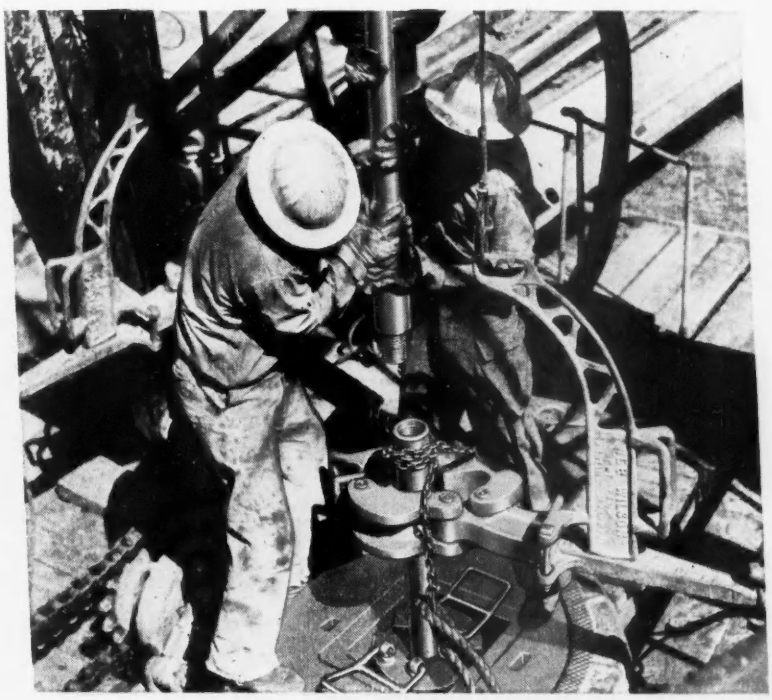

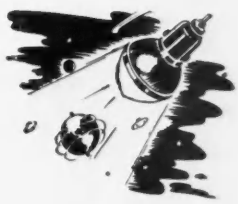

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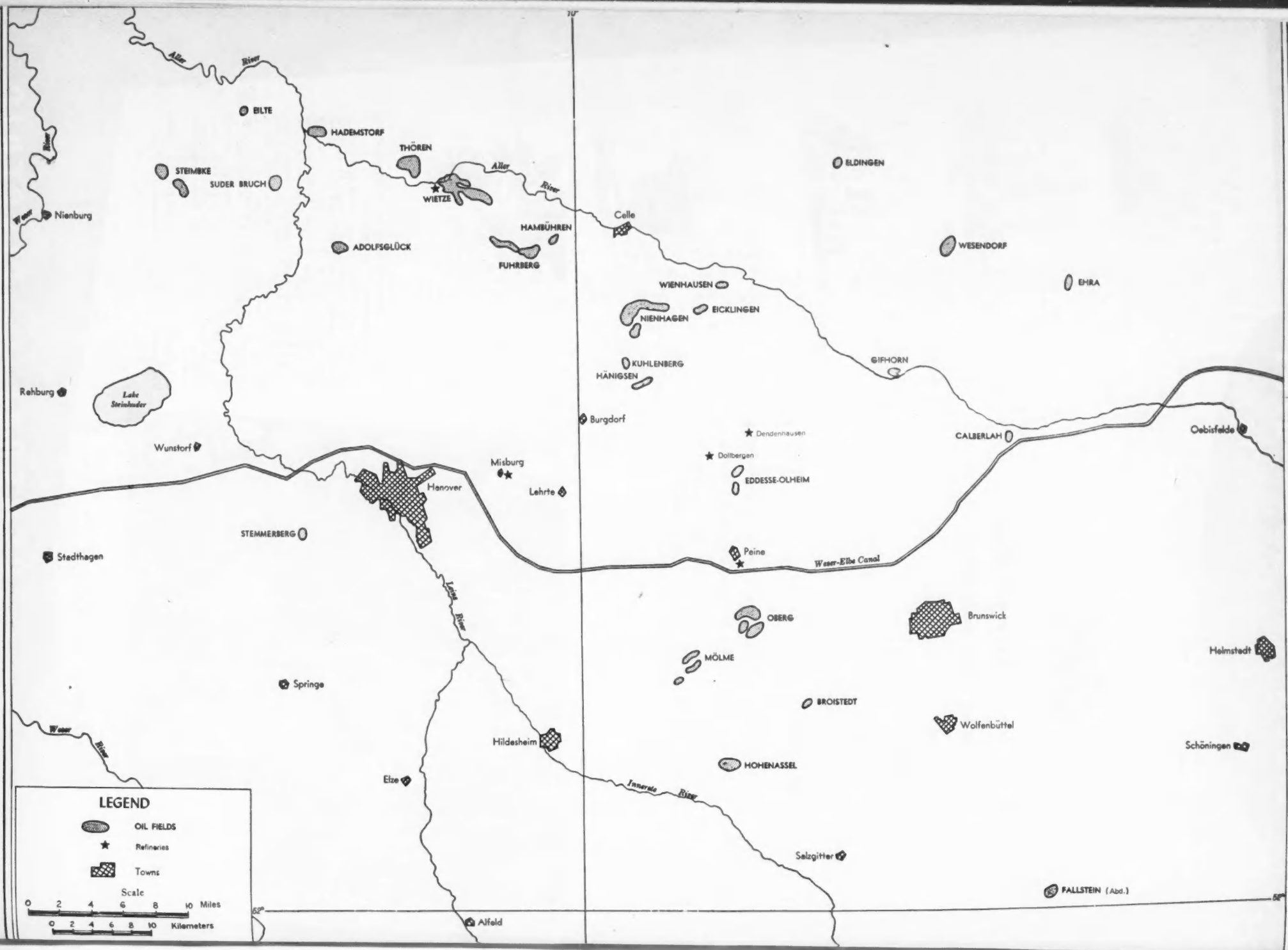


GERMANY—Hanover Fields

GERMANY

TOTAL German crude output for 1949 was 5,891,032 barrels, or a little over 32 percent gain over 1948. This is the highest production for Germany since the war year 1944 when slightly more than 6 million barrels were produced. During the year drilling volume increased 88 percent with 352 wells completed to compare with 187 in 1948.

Intensive development work in the older fields of the Hanover, Hamburg, and Schleswig-Holstein regions increased production noticeably but the Emsland region again showed the big gain. The Emlichheim, Georgsdorf, and Lingen fields in the Emsland area accounted for 37 percent of the annual production.

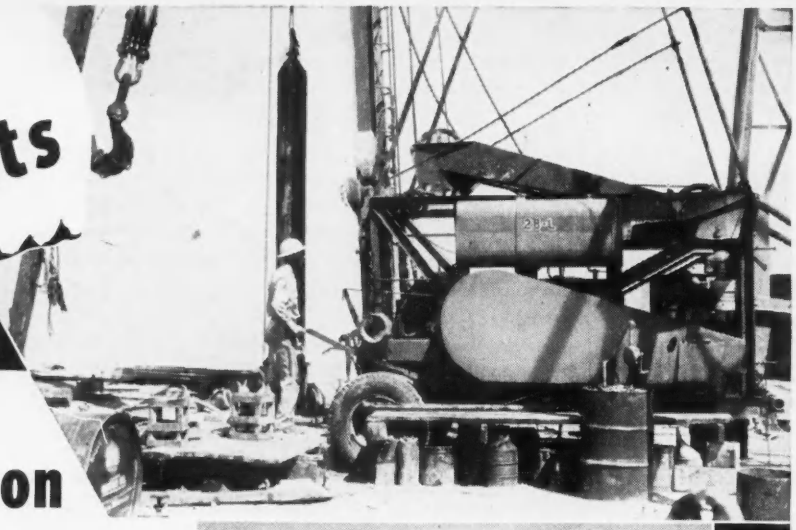
The Nienhagen-Hanigsen field of the Hanover region, which has always been the biggest producer of oil in Germany, was surpassed by both the Emlichheim and Georgsdorf fields. With increased development and new field discoveries at Suderbruck and Ruehlertwist, Western Germany's proved reserves were rated at about 260 million barrels at the end of the year by Germany's Geological Research Office. This is an increase of 80 percent for reserves compared to the same group's figures at the end of 1948. The greatest part of these proven reserves was attributed to the Emsland region and the Suderbruck discovery accounted for 84 percent of the increase in the Hanover region.

During 1949 there were 64 wildcats drilled in Germany as compared with 41 drilled in 1948. Besides the Suderbruck and Ruehlertwist discoveries during the year, five other fields

Engineering and Geological Data on German Fields

REGION and FIELD	Est. Proved Area (Acres)	Gravity Oil (API)	Name	Kind	Age	DEPTH (Feet) Minimum to Top of Pay	DEPTH (Feet) Maximum to Bottom of Pay	Average Thickness of Pay (Feet)	Type of Structure
BADEN:									
Forst-Weiher	500	32–34	Keuper	Sandstone	Triassic	1250	1380	60	Tilted Fault Blocks
			Upper Eocene		Tertiary	1800	2600	10	
			Dogger		Jurassic	2230	2460	100	
Weingarten	500	32–36	Meletta beds	Sand	Middle Oligocene	800	1600	230–500	Tilted Fault Blocks
			Pechelbronn beds		Lower Oligocene				
EMSLAND:									
Adorf	120	30	Wealden	Shell beds	Lower Cretaceous	4050	4400	350	Anticline
Bentheim	2970	49	Platten-dolomite	Dolomite	Zechstein (Permian)	5250	5580	115	Anticline
Emlichheim	2000	25	Bentheim sandstone (Valendis)	Sand	Cretaceous	2430	2890	80	Anticline
Georgsdorf	3000	24	Bentheim sandstone (Valendis)	Sand	Cretaceous	1600	3300	130	Anticline
Lingen	1000	30–32	Valendis, Wealden	Sand	Cretaceous			20–50	
			Apt	Marl	Cretaceous	2570	3800	50–140	Fault Blocks
			Serpulite	Lime	Jurassic			1–2	
Ruehlermoor-Ruehlertwist	2500	25	Bentheim sandstone (Valendis)	Sand	Cretaceous	2050	2790	60–120	Anticline
Scheerhorn	....	30	Benthim sandstone (Valendis)	Sand	Cretaceous	3632	3684	50	Stratigraph Trap
HAMBURG:									
Reitbrook	850	21–23	Lower Eocene	Sand	Tertiary	1460	1635	115	Satl Dome
			Reitbrook beds	Lime	Upper Cretaceous	2100	2600		
HANOVER:									
Adolfsglueck	....	40	Rhaetic	Sandstone	Triassic	2600	3300	15	Salt Dome
Broistedt	160	33	Valendis	Sandstone	Lower Cretaceous	2400	3200	16–65	Salt Dome
Calberlah	....	19–22	Dogger	Sandstone	Jurassic	160	400	16–20	Salt Dome
Eddesse-Oelheim	50	32	Rhaetic	Sandstone	Triassic	2800	3300	20–40	Salt Dome
Ehra	75	16	Lower Dogger	Sandstone	Jurassic	490	820	33	Salt Dome
Eicklingen-Wienhausen	....	32–33	Valendis, Wealden	Sandstone	Lower Cretaceous	1640	3050	65	Salt Dome
Eilte	....	23	Wealden	Sand	Lower Cretaceous	3560	3700	55	Salt Dome
Eldingen	....	34	Angulaten Sandstone	Sandstone	Liassic	5223	....	....	Anticline
Etzel	75	13	Cap Rock	Lime Breccia	Jurassic	4560	4700	33	Salt Dome
Fuhrberg-Hambuehren	....	23	Cornbrash (Dogger)	Sandstone	Jurassic	260	1935	115–130	Salt Dome
Gifhorn	60	17	Wealden	Sandstone	Cretaceous	660	820	100	Salt Dome
Hademstorf	70	25	Wealden	Sand	Cretaceous	4100	4500	30	Salt Dome
Hohenassel	50	30	Coral Oolite	Limestone	Jurassic	1280	2070	130	Salt Dome
Meckelfeld	....	24	Reitbrook beds	Lime	Middle Cretaceous	385	1380	65–100	Salt Dome
			Lower Cretaceous	Sandstone	Lower Cretaceous	1480	1670	40–65	
Moelme	100	32	Wealden	Sandstone	Cretaceous				
			Coral Oolite	Limestone	Jurassic	160	1800	30–100	Salt Dome
			Rhaetic	Sandstone	Triassic				
Neinbagen	4300	22–32	Valendis	Sand	Lower Cretaceous			65	
			Wealden	Sandstone	Lower Cretaceous	600	5350	30	Salt Dome
			Cornbrash	Lime					
				Sandstone	Jurassic			65	
Nienhagen-Haenigsen	100	24–28	Valendis	Sand	Lower Cretaceous	2245	2770	82	Salt Dome
			Wealden	Sandstone					
Oberg	600	36–40	Wealden	Sand	Lower Cretaceous	520	1910	20	Salt Dome
			Lower Dogger	Sand	Jurassic				
Steimbke-Rodewald	....	19	Wealden	Sand	Lower Cretaceous	790	1030	65	Salt Dome
			Serpulite	Lime	Uppe Jurassic	820	2400	20	
			Cornbrash	Sandstone	Middle Jurassic	950	2130	72	
Stemmerberg	....	25	Cornbrash	Sandstone	Middle Jurassic	....	2600	....	Overthrust Fold
Suderbruch	....	35	Cornbrash	Sandstone	Jurassic	6690	6800	46	Anticline
Thoeren	125	19–34	Wealden	Sandstone	Cretaceous	1575	1720	165	Salt Dome
			Cornbrash		Jurassic	2829	2990	140	
			Rhaetic		Triassic	....	4000	65	
Wesendorf	250	13	Neocomian	Sand	Cretaceous	....	1410	50	Salt Dome
		37	Lower Dogger	Sandstone	Jurassic	2630	3600	15–30	
		40	Liassic	Sandstone	Jurassic	....	5970	80	
Wietze	570	18–27	Senonian	Sandstone	Cretaceous	300	1000	30–65	Salt Dome
			Wealden		Cretaceous	300	1000	200	
			Cornbrash		Juraccis	300	1000	200	
			Rhaetic		Triassic	590	1080	80–100	
SCHLESWIG-HOLSTEIN:									
Heide	1250	31	Basal Breccia of the Lower Cretaceous	Sandstone	Cretaceous	2950	4500	30–130	Salt Dome
			Zechstein	Limestone	Paleozoic	2590	3600	26	
Hohenhorn	....	13	Dogger	Sandstone	Jurassic	2635	2740	25	Salt Dome

R_x for Oil Field Profits



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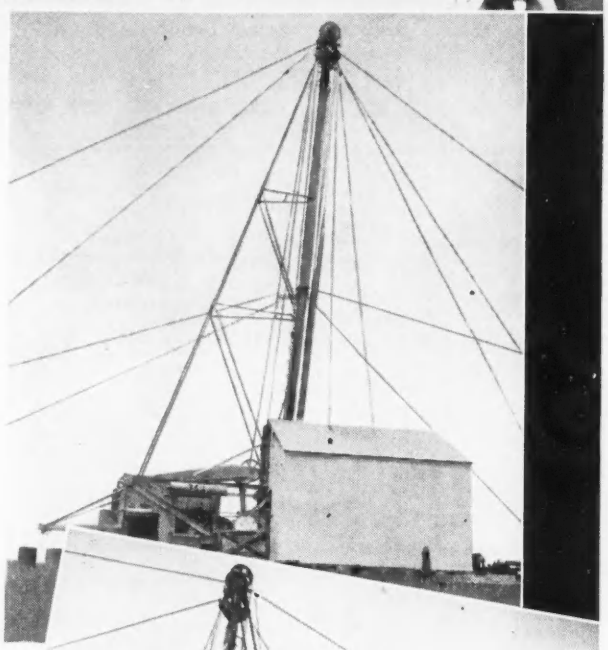

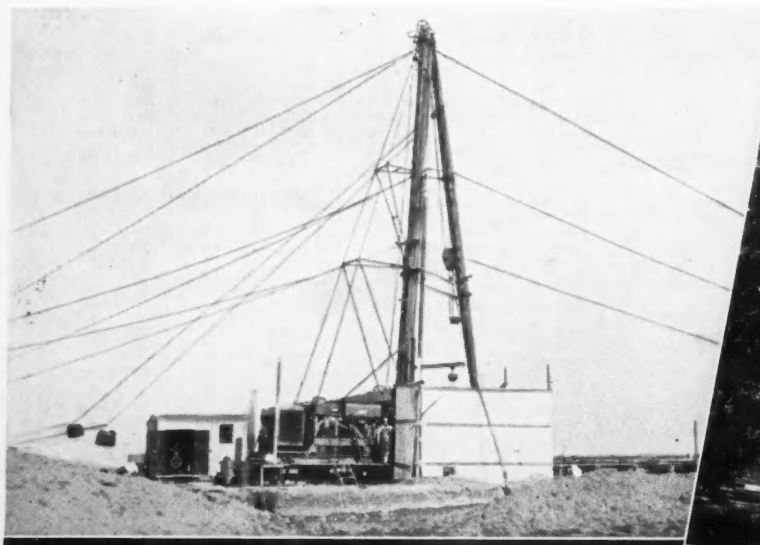

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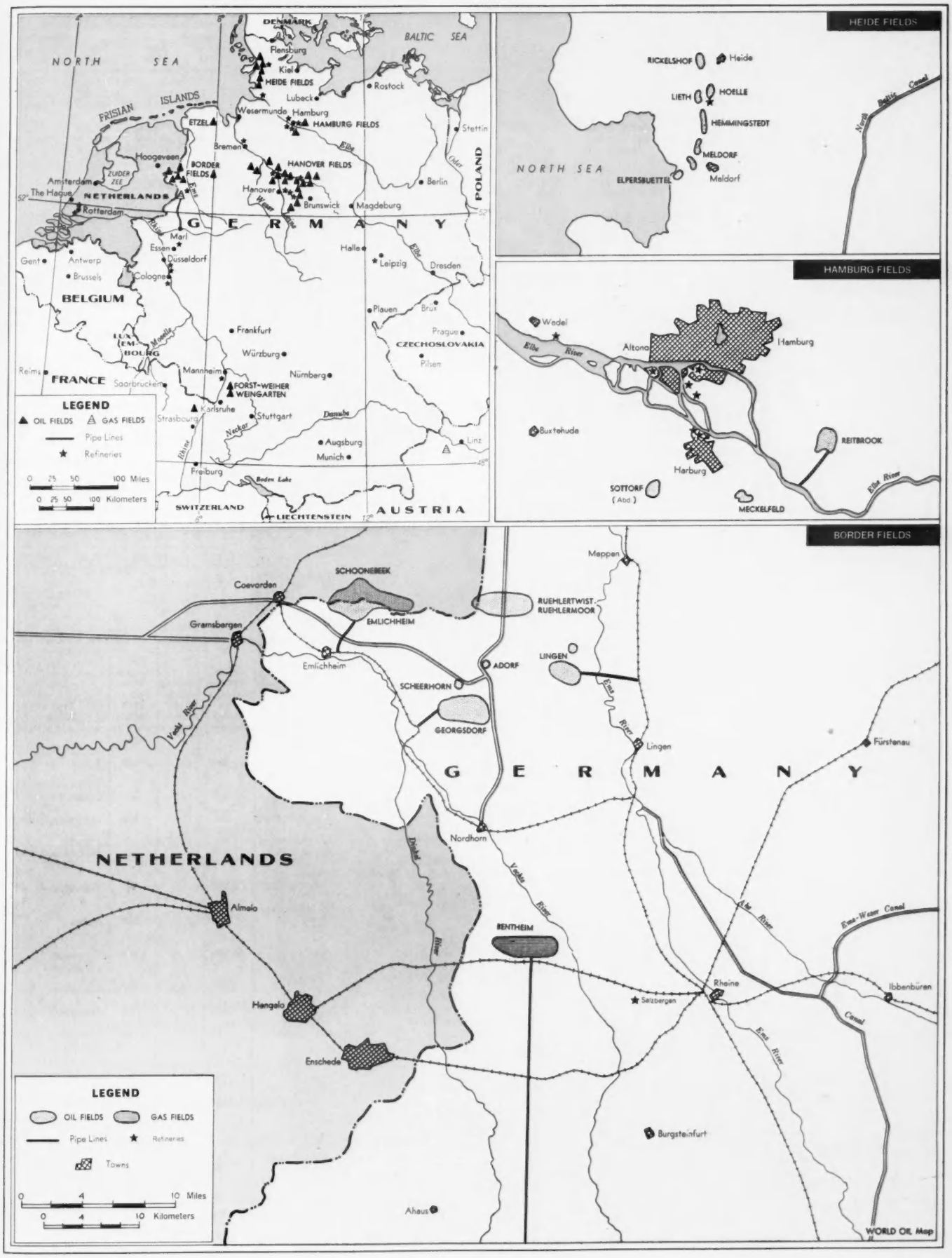
GERMANY and THE NETHERLANDS–Border, Hamburg and Heide Fields



GERMANY—Continued

Oil Production and Producing Wells in Germany

REGION and FIELD	OPERATING COMPANY	Year of Discovery	PRODUCING OIL WELLS END OF 1949			CRUDE OIL PRODUCTION			
			Flowing	Art. Lift	Total	Daily End of 1949	Year 1948	Year 1949	Cumulative Through 1949
BADEN:									
Forst-Weiher	Itag	1934	....	48	48	63	27,720	22,267	543,267
Weingarten	C. Deilmann	1936	....	74	74	58	14,560	19,033	269,433
EMSLAND:									
Adorf	C. Deilmann (Gewerkschaft Elwerath, Preussag, Wintershall, 25% each)	1946	....	1	1	22	15,141	14,301	29,442
Emlisbheim	Wintershall A. G.	1944	....	47	47	3,286	453,950	902,559	1,960,559
Georgsdorf	Preussag (C. Deilmann, Gew. Elwerath, Wintershall, 25% each)	1944	72	6	78	3,113	371,672	924,756	1,661,356
Lingen	Deutsche Schachtbau & Tiefbohr GmbH. (Gew. Elwerath, 50%)	1942	....	68	68	1,142	334,166	420,280	1,600,280
Ruehlermoor	Deutsche Schachtbau & Tiefbohr GmbH. (Gew. Elwerath, 50%)	1949	1	1	2	117	.....	5,803	5,803
Ruehlertwist	Wintershall (C. Deilmann, Gew. Elwerath, Preussag, 25% each)	1949	....	....	....	17	.....	2,688	2,688
Scheerhorn	C. Deilmann (Gew. Elwerath, Preussag, Wintershall, 25% each)	1949	1	....	1	136	.....	4,193	4,193
HAMBURG:									
Reitbrook	Preussag, Deutache Vacuum Oel A. G., 50% each)	1937	52	65	117	824	269,101	293,818	8,413,818
HANOVER:									
Adolfsglueck	Deutche Erdoel A. G.	1936	....	1	1	3	.....	175	2,135
Broistedt	Preussag, Gewerkschaft Elwerath	1937	....	8	8	96	28,441	36,407	226,407
Calberlah	Gewerkschaft Elwerath	1945	....	8	8	27	3,129	10,990	22,990
Eddesse-Oelheim	Preussag, Deutsche Erdoel A. G.	1876	....	20	20	41	16,450	15,456	1,641,956
Ehra	Deutsche Erdoel A. G.	1939	....	13	13	13	4,284	4,221	68,521
Eicklingen-Wienhausen	Wintershall, Gewerkschaft Elwerath, Itag	1937	....	17	17	205	91,308	75,439	1,736,439
Eilte	Deutsche Vacuum Oel A. G., Wintershall	1947	....	1	1	5	1,708	3,178	5,486
Eldingen	Gewerkschaft Elwerath	1949	1	....	1	9	.....	266	266
Etzel	Preussag	1942	....	1	1	39	31,031	19,383	167,383
Fuhrberg-Hambuehren	Wintershall, Gewerkschaft Brigitta, Itag	1939	....	169	169	956	334,208	354,487	3,008,487
Gifhorn	Deutsche Erdoel, A. G.	1935	....	35	35	37	9,135	11,942	291,042
Hademstorf	Deutsche Vacuum Oel A. G.	1941	....	12	12	304	65,919	98,714	388,714
Hohenassel	Gew. Elwerath, Preussag, Braunchweigische Bohrgesellschaft mbH	1943	....	26	26	335	131,649	130,998	1,101,998
Meckelfeld	Wintershall, Gewerkschaft Elwerath	1938	....	22	22	57	14,847	20,244	339,244
Moelme	Gewerkschaft Elwerath	1935	....	43	43	97	33,131	36,757	985,757
Nienhagen-Haenigsen	Gew. Elwerath, Wintershall, Deutsche Vacuum, Itag, Ferd. Koller & Sohn, Deutsche Erdoel A.G.	....	4	246	250	2,307	870,821	876,134	32,067,134
Oberg	Deutsche Vacuum, Itag, G. Greiser	1919	....	78	78	158	39,767	52,612	2,252,612
Steimbke-Rodewald	Gewerkschaft Brigitta, Deutsche Vacuum	1936	....	187	187	1,060	264,100	354,100	3,140,200
Stemmerberg	Gewerkschaft Elwerath	1948	....	....	....	.....	714	175	889
Suderbruch	Gewerkschaft Brigitta, Deutsche Vacuum	1949	1	....	1	155	.....	22,862	22,862
Thoeren	Deutsche Erdoel A. G., Gew. Brigitta, Deutsche Vacuum	1941	....	58	58	308	120,470	119,294	1,029,794
Wesendorf	Deutsche Erdoel A. G., Gew. Elwerath, Preussag	1943	22	8	30	1,305	356,202	403,473	2,033,473
Wietze	Deutsche Erdoel A. G.	1874	....	342	342	518	161,385	177,198	16,608,198
SCHLESWIG-HOLSTEIN:									
Heide	Deutsche Erdoel A. G.	1935	....	53	53	1,167	354,921	392,140	8,946,140
Hohenhorn	Gewerkschaft Elwerath, Preussag	1949	....	....	....	68	.....	210	210
	Total	....	154	1,658	1,812	18,049	4,419,930	5,826,553	90,579,176

Refineries of Germany

COMPANY	Location of Plant	Crude Charging Capacity (Bbls. Daily)	Cracking Capacity (Bbls. Daily)	Daily Crude Runs End of 1949 (Bbls.)	Type of Refinery
British Occupation Zone					
Deutsch-Amerikanische Petroleum-Gesellschaft (Standard of New Jersey)	Hamburg-Harburg	11,200	....	8,500	Skimming, Asphalt
Deutsche Erdoel A.G.	Heide (Holstein)	1,900	....	1,000	Skimming, Lubes, Asphalt
	Wietze (Hanover)	950	....	1,100	Skimming, Lubes, Asphalt
Deutsche Gasolin A.G.	Dollbergen (Hanover)	1,800	....	1,200	Skimming, Lubes, Asphalt
Deutsche Shell A.G.	Hamburg-Harburg	8,500	....	6,000	Skimming, Lubes, Asphalt, Wax
	Monheim on Rhine	3,500	....	2,000	Skimming, Lubes
	Dusseldorf-Reisholz	750*	....	800	Gasoline Rerunning
	Hamburg-Grasbrook	550*	....	700	Lubes
	Hamburg-Wilhelmsburg	450*	....	600	Gasoline Rerunning
Deutsche Vacuum Oel A.G.	Bremen-Oslebshausen	14,000	....	3,700	Skimming- Lubes, Wax
	Wedel on Elbe	700*	....	500	Lubes
Eurotank (Anglo-Iranian)	Hamburg-Finkenwerder	11,500	5,800	....	Skimming, Cracking
Gelsenberg Benzin A.G.	Gelsenkirchen	14,500	....	6,300	Skimming, Hydrogenation
Gewerkschaft Deurag-Nerag	Misburg	9,000	3,500	6,400	Complete
Johann Haltermann	Hamburg-Wilhelmsburg	1,200*	....	1,000	Gasoline Rerunning
Mineraloel- & Asphaltwerke A.G. MAWAG	Ostermoor (Holstein)	1,150	....	....	Skimming, Asphalt
Mineraloelwerke Albrecht & Co.	Hamburg-Grasbrook	250*	....	120	Lubes
Mineraloelwerk Grasbrook GmbH. (DEA)	Hamburg-Grasbrook	950*	....	....	Lubes, Wax
Mineraloelwerke Peine (Schindler)	Peine (Hanover)	350	....	350	Skimming, Lubes
Mineraloelwerke Albert Sengewald	Dedenhausen (Hanover)	470	....	....	Skimming, Lubes
Oelwerke Julius Schindler GmbH	Hamburg-Wilhelmsburg	2,300	....	1,000	Skimming, Lubes
Ernst Schliemann's Oelwerke GmbH	Hamburg-Grasbrook	750*	....	250	Lubes
Union Rheinische Braunkohlen-Kraftstoff A.G.	Wesseling	14,500	....	5,300	Skimming, Hydrogenation
Wintershall A.G.	Salzbergen (Emsland)	1,400	420	1,300	Complete
Coelner Benzin-Raffinerie GmbH	Cologne	300*	....	180	Gasoline Rerunning
Georg Greiser	Dollbergen (Hanover)	75	....	40	Skimming, Lubes
American Occupation Zone					
Griesheim Elektron	Griesheim	700*	....	300	Gasoline Rerunning
Zeller & Gmelin	Eislingen (Wuerttemberg)	150	....	....	Skimming, Lubes
French Occupation Zone					
Badische Anilin- & Soda-Fabrik	Ludwigshafen-Oppau	700*	....	....	Skimming, Lubes, Wax
Russian Occupation Zone					
Mineraloelwerke	Luetzkendorf	2,200	....	....	Complete

* Half-finished products charging capacity.

GERMANY—Continued

were discovered as a result of deeper exploratory drilling. They are the Reuhlermoor and Scheerhorn fields in Emsland, the Eldingen field in Hanover, and the Hohenhorn field in Schleswig-Holstein with a possible stepout from the Hohenassel field.

The Ruehlertwist strike on the Dutch frontier is believed to be an extension of the Schoonebeek field of Holland. The discovery was at a depth of 2250 feet and four structures are now being developed in the field.

Exploratory drilling continues in Southern Germany's Rhine Valley between Basle and Mayence, in Southern Hegau, and near Bodensee Lake where a strike was recently reported. Part of the recent successes in German exploratory work is due to testing anticlinal structures between salt domes and a stratigraphic trap accounted for the good strike at Scheerhorn. Offshore drilling will probably result this year on the strength of a strike at Meldorf close to the sea dike in Northern Germany.

The rehabilitation of Germany's war damaged refineries continues apace of domestic production. Throughput for 1949 was about 7,730,100 barrels as compared with 3,180,000 barrels in 1948. The Hamburg-Harburg refinery was put in partial service during the year as was the Hamburg-Wilhelmsburg plant.

Imports to Germany during 1949 were 10,340,000 barrels of all products as compared with 8,552,000 barrels the previous year. About half of this year's imports was crude with diesel oil making up most of the remainder.

Two new refineries are in the planning stage now that domestic crude production has increased beyond expectations. One to be built near Lingen to handle Emsland crude will include a cracking unit and is to have an annual capacity of over 4 million barrels. Another to be built at Stadersant on the Lower Elbe River will have an annual capacity of 2.5 million barrels.

Drilling in Germany

REGION and FIELD	WELLS COMPLETED IN 1948				WELLS COMPLETED IN 1949				Wells Drilling End of 1949
			TOTAL				TOTAL		
	Oil	Dry	Wells	Footage	Oil	Dry	Wells	Footage	
BADEN:									
Forst-Weiher	2	3	5	12,150	1	1	2	4,916	1
Weingarten	1	..	1	1,945	2	2	4	6,773	1
Wildcats	..	..	...	.....	...	1	1	2,180	....
BAVARIA:									
Wildcats	..	..	...	.....	...	1	1	7,236	....
EAST FRIESLAND:									
Wildcats	..	1	1	4,955	...	2	2	11,344	....
EMSLAND:									
Adorf	..	1	1	5,771	...	3	3	9,436	....
Emlichheim	10	3	13	36,250	27	1	28	74,279	3
Georgsdorf	20	3	23	59,900	42	2	44	112,083	2
Lingen	10	1	11	39,100	22	...	22	70,552	5
Ruehlertwist	..	..	...	.....	1	...	1	2,938	1
Wildcats	..	7	7	25,041	6	7	13	43,286	....
HAMBURG:									
Reitbrook	4	1	5	8,050	5	2	7	11,945	1
Wildcats	..	..	...	.....	...	1	1	4,645	....
HANOVER:									
Broistedt	1	1	2	4,803	3	...	3	5,663	....
Calberlah	1	1	2	2,723	4	4	8	3,004	....
Etzel	..	1	1	4,709	...	...	...	.....	....
Fuhrberg-Hambuehren	21	4	25	37,297	22	14	36	36,963	1
Hademstorf	3	1	4	17,932	4	1	5	22,619	...
Hohenassel	6	2	8	14,125	4	3	7	10,296	1
Nienhagen-Haenigsen	..	5	5	23,100	1	3	4	4,685	1
Oberg	..	2	2	3,486	7	4	11	8,079	....
Steimbke-Rodewald	10	8	18	37,730	42	21	63	120,939	....
Suderbruch	..	..	...	.....	2	...	2	7,907	1
Thoeren	1	1	2	17,400	2	3	5	13,290	1
Wesendorf	4	4	8	25,311	10	6	16	37,861	4
Wildcats	1	27	28	123,301	4	36	40	160,846	....
MUENSTERLAND:									
Wildcats	..	1	1	3,752	...	...	...	.....	....
OLDENBURG:									
Wildcats	..	3	3	14,912	...	1	1	4,052	....
SCHLESWIG-HOLSTEIN:									
Heide	4	3	7	23,622	9	5	14	47,054	2
Wildcats	..	2	2	5,703	1	4	5	19,480	....
Total	99	86	185	553,068	221	128	349	864,351	25

Pipe Lines of Germany

COMPANY	Origin	Terminus	Length, (Miles)	Diameter, (Inches)	Capacity of Line (Bbls. Daily)	Year Completed
Crude Oil Lines:						
Deutsche Schachtbau & Tiefbohr—GmbH.	Lingen	Railway at Geeste	6	6	13,500	1948
Erdoelbetrieb Reitbrook (Socony-Vacuum & Preussag)	Reitbrook	Warwisch on River Elbe	5	6, 8	.....	1939
Preussag	Georgsdorf	Railway at Veldhausen	3.5	Two 4	.....	1948
Wintershall AG	Emlichheim	Railway at Emlichheim	3.5	4	4,700	1948
Natural Gas Lines:						
C. Deilmann Bergbau GmbH.	Bentheim	Huels (near Marl)	48	8	18 mmcf	1943

GREAT BRITAIN

NO DRILLING was done in Great Britain during 1949 and the country's total production for the year was only 338,200 barrels

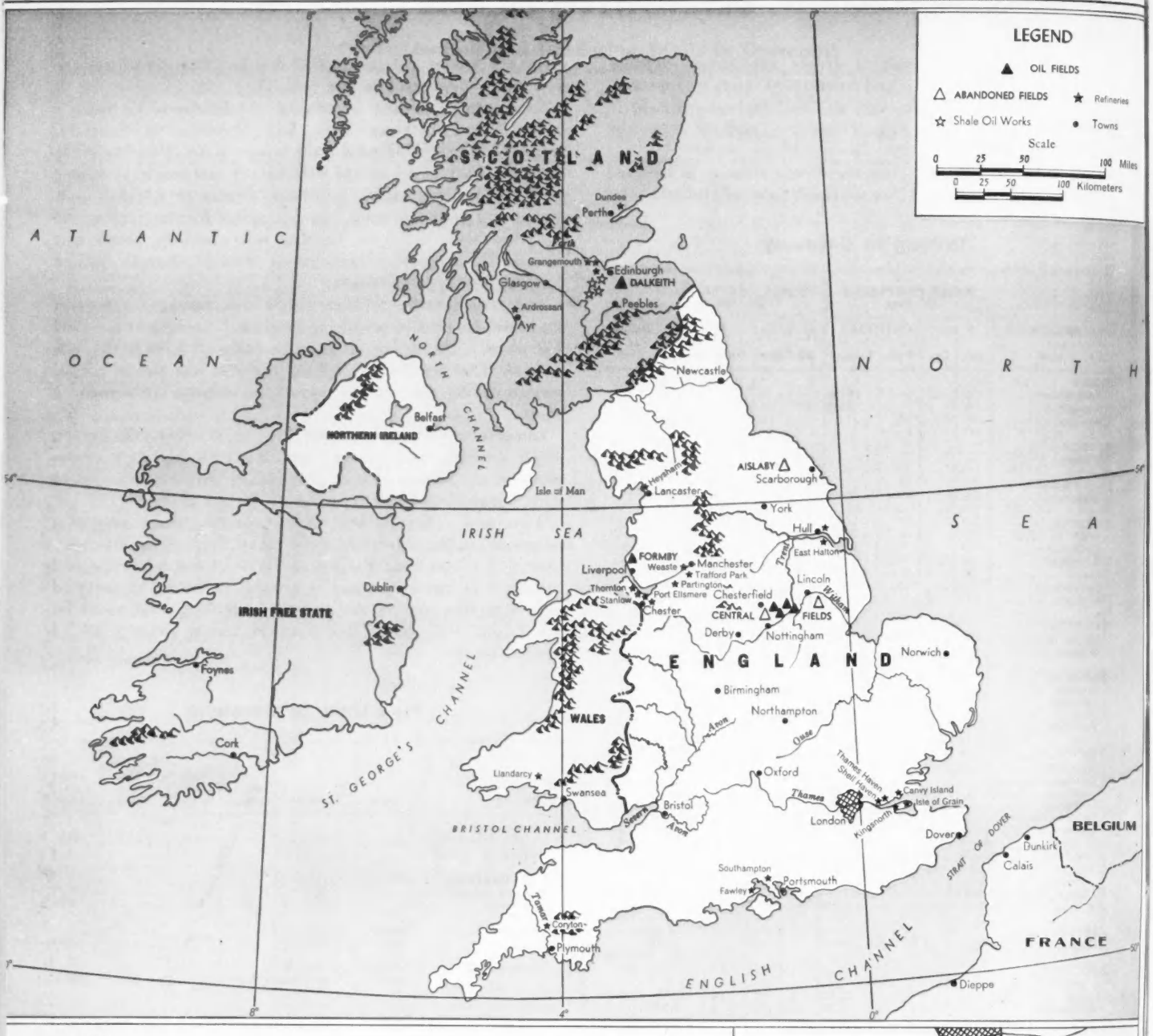
The Eakring field showed a slight increase in production over 1948 due to a systematic program of water injection. Attempts to bolster domestic production by development of new sources of supply have met with failure in the past three years and there was no immediate geological incentive for wildcat drilling in 1949. The D'Arcy Exploration Company, Ltd., operates all of the producing fields in Great Britain with the exception of the small Dalkeith field in Scotland, which is controlled by Anglo-American Oil Company.

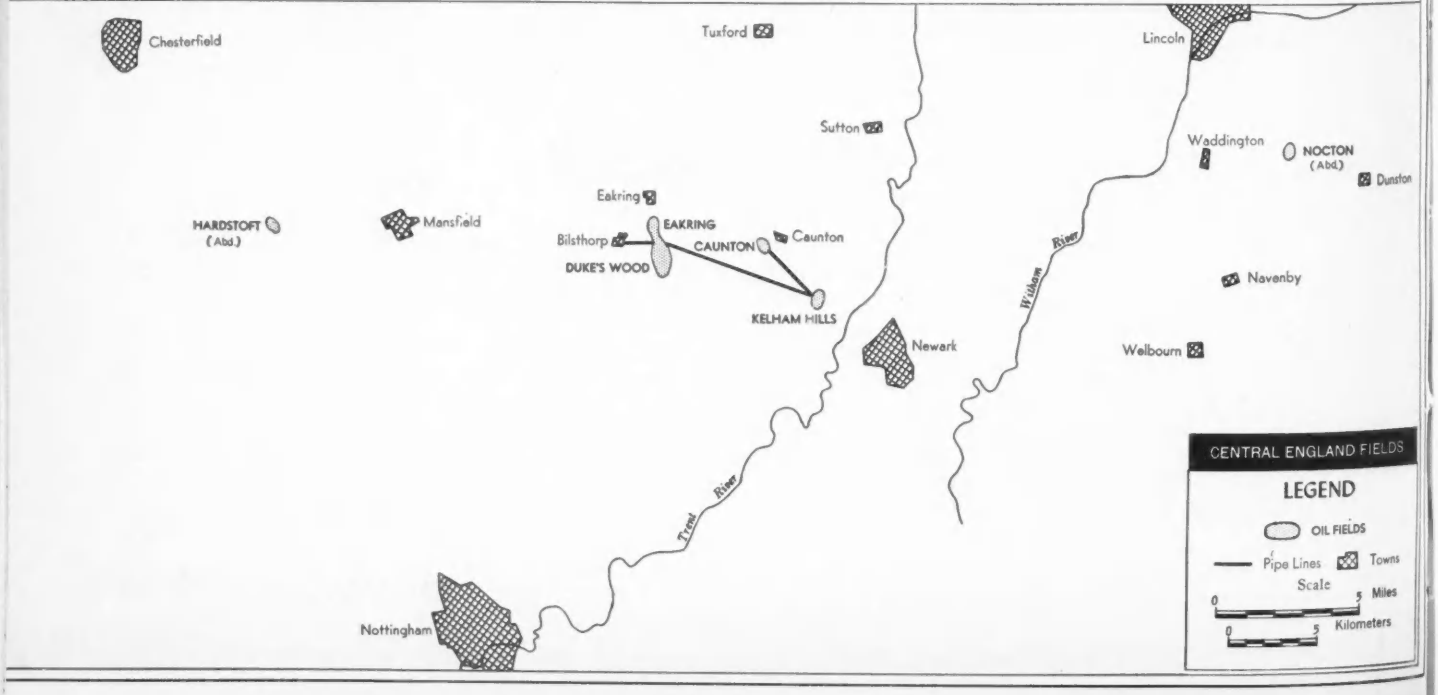
In mid-1949 the Minister of Fuel and Power announced that a prospecting license had been granted D'Arcy Exploration covering about 153 square miles in the counties of Derby and Nottingham. At the same time a similar license was renewed for 12 months covering a 190-square mile section of Durham and York counties for the same company. No work has been reported in either area.

Great Britain's peak year of domestic production was 1943 when she produced about 839,000 barrels and her annual imports are about 34 million barrels.

The refinery facilities of the country are under an intensified program of expansion. Consumption of oil is expected to reach 115,900,000 barrels annually by 1953 and throughput capacity of refineries is expected to be increased to 122,-800,000 barrels annually by that time as compared with capacity for 1948 of 34,600,000 barrels. Part of this large

GREAT BRITAIN





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GREAT BRITAIN—Continued

increase in rated capacity will be gained with the completion of the Esso refinery at Fawley which will have an annual throughput capacity of 31.5 million barrels. In addition to this plant, partial completion of the Anglo-Iranian Oil Company, Ltd., refinery at Llandarcy, South Wales, has already increased Britain's refinery capacity 14.6 million barrels annually. A new petrochemical plant being built by Imperial Chemicals Industries at Wilton will have its first stage completed by 1953, when it will have a cracking capacity of 15.7 million barrels of oil per year. Expansion of the Grangemouth refinery in Scotland is under way and will boost capacity to 11 million barrels a year.

Refineries of Great Britain

COMPANY	Location of Plant	Crude Charging Capacity (Bbls. Daily)	Cracking Capacity (Bbls. Daily)	Type of Refinery
ENGLAND:				
Anglo-American Oil Co., Ltd.	Fawley (S. Hampton)	18,900	6,000	Cracking, Distillation
	Pt. Ellesmere (Cheshire)	500	None	Distillation
Berry, Wiggins & Co., Ltd.	Kingsnorth (Kent)	2,100	None	Crude Distillation
	Weaste (Manchester)	1,500	None	Crude Distillation
Cory Bros. & Co., Ltd.	Coryton (Devonshire)	3,000	2,000	Topping, Cracking
Lobitos Oilfields, Ltd.	Pt. Ellesmere (Cheshire)	2,500	1,000	Solvent, Cracking
Manchester Oil Refry., Ltd.	Trafford Pk. (Manchester)	2,800	None	Crude Distillation, Solvent, Treating
Petrochemicals	Partington (Manchester)	None	2,000	Crude Distillation, Cracking, Treating
Shell Refining & Marketing Co., Ltd., & Starhaven Refineries, Ltd.	Shellhaven (London)	16,600	None	Lube, Asphalt, Topping
	Stanlow (Pt. Ellesmere)	37,700	None	Lube, Asphalt Distillation, Topping
Shell Refining & Marketing Co., Ltd.	Heysham (Lancashire)	34,000	None	Distillation
SCOTLAND:				
Wm. Briggs & Sons, Ltd.	Dundee (Firth of Tay)	700	None	Distillation
Scottish Oils Ltd., (Anglo-Iranian Oil Co.)	Pumpherston (Midlothian)	3,700	1,300	Topping, Waxes
	Grangemouth (Stirling)	14,000	3,000	Topping, Cracking
Starhaven Refineries, Ltd.	Ardrossan (Ayrshire)	4,300	None	Asphalt, Topping
WALES:				
National Oil Refineries, Ltd., (Anglo-Iranian Oil Co.)	Llandarcy (Carmathen, Swansea)	60,000	4,000	Topping, Cracking

Oil Production and Producing Wells in Great Britain

COUNTY and FIELD	Year of Discovery	PRODUCING OIL WELLS END OF 1949		CRUDE OIL PRODUCTION (Barrels)			
		Art. Lift	Total	Daily End of 1949	Year 1948	Year 1949	Cumulative Through 1949
ENGLAND:							
Lancashire:							
Formby	1939	8	8	5	2,200	2,000	61,000
Nottinghanshire:							
Caunton	1943	10	10	23	12,000	10,000	164,000
Duke's Wood	1941	115	115	400	152,000	152,000	2,036,000
Eakring	1939	53	53	320	91,000	117,000	1,274,000
Kelham Hills	1941	52	52	145	65,000	56,000	914,000
SCOTLAND:							
Midlothian:							
Dalkeith	....	....	....	3	1,200	1,200	18,939
Total	....	238	238	896	323,400	338,200	4,467,939

Note: All producing fields except Dalkeith operated by D'Arcy Exploration Co., Ltd.

Engineering and Geological Data on Great Britain Fields

COUNTY and FIELD	Gravity Oil (API)	Name	Kind	Age	Depth (Ft.) Min. Top of Pay	Depth (Ft.) Max. Bottom of Pay	Avg. Thickness Pay (Ft.)	Type of Structure
ENGLAND:								
Lancashire:								
Formby	37	Keuper Waterstones	Sand Shaley Clay	Triassic Triassic	80	250	20	Faulted Monocline
Nottinghamshire:								
Caunton	23.9-31.1	U. Grit M. Grit	Sandstone	Upper Carboniferous	2170	2300	12	Dome with faulting
Duke's Wood	32.5-33.6	B.Sandstone Rough Rock Longshaw Grit Chatsworth Grit L. Carboniferous	Sandstone Limestone	Upper and Lower Carboniferous	1800 2500	2270 2640	20 70 20 60	 Dome with faulting
Eakring	34.4-37.6	B.Sandstone Rough Rock Longshaw Grit Chatsworth Grit Kinderscout Grit	Sandstone	Upper Carboniferous	1780	2260	10 60 20 100 40	 Dome with faulting
Kelham Hills	27.1-29.3	U. Grit L. Grit	Sandstone	Upper Carboniferous	2050	2280	40 30	Dome with faulting
SCOTLAND: Midlothian:								
Dalkeith	39.6	.....	Sandstone	Lower Carboniferous	1728	1760	..	Anticline

HUNGARY

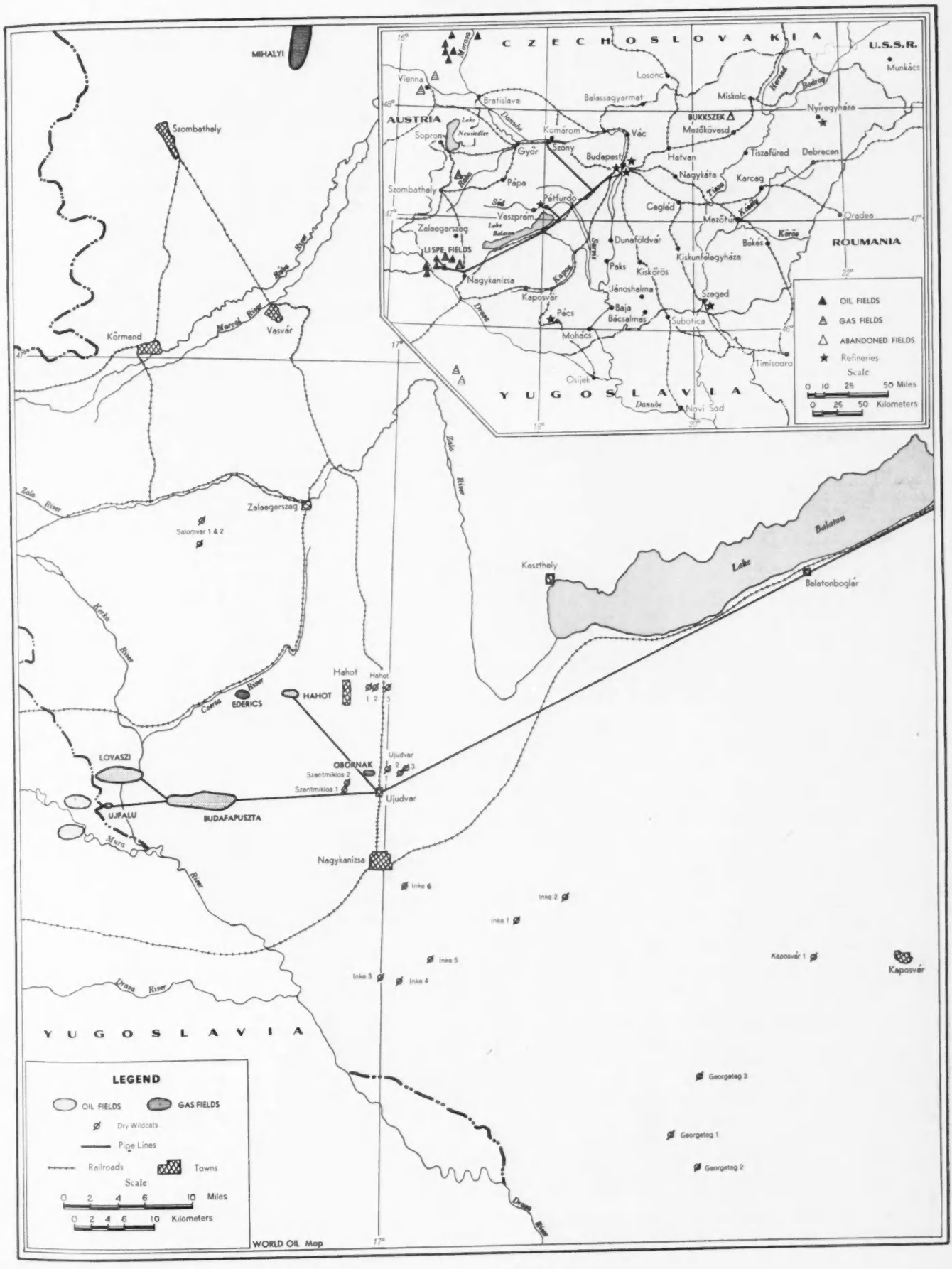
HUNGARY had an estimated oil production for 1949 of about 3,371,000 barrels, a figure based on a reported 15 percent decline from the 1948 total. Since Hungary's seizure of the properties of the Hungarian American Oil Company (MAORT), a Standard Oil Company (N. J.) subsidiary, in September, 1948, little detailed or reliable information has been available on petroleum activities.

About 60 percent of Hungary's production comes from the Lovaszi field with the remainder from the Budafapuszta, Hahot and Bukkszek fields in that order. A small new field near Sojter in the Hahot vicinity produced about 10,000 barrels in 1949 and has not lived up to predictions made when the field was discovered in late 1948.

In the first part of 1949 a gas field was found near Obornak, about six miles northwest of Nagykanizsa. Initial production was about 7000 cubic feet per day for the first well—the gas testing about 5 percent helium. Offsetting the Hahot oil field to the west another gas discovery was made during 1949 but no details on volume are available. The discovery is designated as the Hahot-Ederics gas field. Another gas discovery in northwest Hungary, above the Raba River, called the Mihalyi field produces practically pure carbon dioxide.

Drilling continued through 1949 with Hungary's seven rigs, mostly in areas of known production. The country's drilling equipment is old and in some cases obsolete and there is little prospect of Russia contributing replacement

HUNGARY


CZECHOSLOVAKIA
U.S.S.R.
AUSTRIA
ROUMANIA
YUGOSLAVIA
Vienna
Bratislava
Balassagyarmat
Losonc
Miskolc
Munkács
Nyíregyháza
Sopron
Komárom
Győr
Szony
Budapest
Vác
Hatvan
Tiszafüred
Debrecen
Nagykáta
Karcag
Szombathely
Pápa
Pétfurdo
Cegléd
Mezőtúr
Oradea
Veszprém
Zalaegerszeg
Dunaföldvár
Békés
Kiskunfélegyháza
Paks
Kiskőrös
Nagykanizsa
Jánoshalma
Kaposvár
Baja
Szeged
Pécs
Bácsalmás
Subotica
Mohács
Timisoara
Osijek
Novi Sad
Mihályi
Körmend
Vasvár
Zalaegerszeg
Saiomvar 1 & 2
Keszthely
Balatonboglár
Balaton Lake
HAHOT
EDERICS
LOVASZI
OBORNAK
UJFALU
BUDAFAPUSZTA
Ujudvar
Inka 1
Inka 2
Inka 3
Inka 4
Inka 5
Inka 6
Kaposvár 1
Georgetag 1
Georgetag 2
Georgetag 3
OIL FIELDS
GAS FIELDS
ABANDONED FIELDS
Refineries
Scale
0 10 25 50 Miles
0 25 50 Kilometers
LEGEND
OIL FIELDS
GAS FIELDS
Dry Wildcats
Pipe Lines
Railroads
Towns
Scale
0 2 4 6 10 Miles
0 2 4 6 10 Kilometers
WORLD OIL Map

HUNGARY—Continued

parts. Hungary attempted to purchase equipment from Western countries during the year but was turned down because of her recent nationalization of foreign holdings in the country which practically amounted to expropriation. The Royal Dutch-Shell Group as well as Jersey Standard lost holdings in the country. Hungary has promised to compensate for the losses but its best offers were about 15 percent of the value of the properties and the overtures were rejected.

In spite of her apparent inability to obtain drilling equipment Hungary has set out a new Five-Year Plan goal of 100 new wells at the Budafapuszta field and 110 at the Lovaszi field from 1950 to 1954. To accomplish this Russia will have to come through with drilling equipment and parts that are sorely needed at home.

Refineries in Hungary

COMPANY	Location of Plant	Crude Charging Capacity (Bbls. Daily)	Cracking Capacity (Bbls. Daily)	Type of Refinery
Fanto Associated Hungarian Oil Co., Ltd.	Budapest	1100	None	Skim-Lube
Maygar Hydrobenzin Részvénytársaság	Pétfürdö	1200	350	Skim-Cracking
Maygar Pet.-Dr. Freund	Csepel (Budapest)	1100	None	Skim-Lube
Nyiregyhaza Petroleumgyar Részvénytársaság	Nyíregyháza	300	None	Skim-Lube
Shell Koolaj Részvénytársaság	Csepel (Budapest)	3850	None	Skim-Lube
Soviet-Hungarian Oil Co.	Pécs	5500	....	....
Szoregi Petroleumfabrik	Szöreg (Szeged)	420	None	Skim-Wax
Vacuum Oil Co. Részvénytársaság	Almásfüzitö (Szöny)	3800	None	Lube-Wax-Asphalt

Engineering and Geological Data on Hungary Fields

COUNTRY and FIELD	Est. Proven Area (Acres)	Gravity Oil (API)	Name	Kind	Age	DEPTH (Ft.) Minimum to Top of Pay	DEPTH (Ft.) Maximum to Bottom of Pay	Average Thickness of Pay	Type of Structure
HEVES:									
Bukkszek	....	....	.....	Tuff	Oligocene	250	4462	....	Anticline
ZALA:									
Budafapuszta	3578	42.5	Le. Pannonian	Sand	L. Pliocene	3500	5786	39	Anticline
Habot	155	31.3	.....	Limestone	L. Pliocene-Miocene	4675	4770	98	Buried Hill
Habot-Ederics	1200	Gas	.....	.....	.....	.....	.....	....	.....
Lovaszi	3017	40	Lovaszi	Sand	L. Pliocene	3950	5139	75	Dome

ITALY

ITALY made 64,050 barrels in 1949 for a daily average of 177 barrels, which is comparable to 1948 production. In contrast to low petroleum output the nation's natural gas production has developed into an important industrial asset. During the year the gas production from the upper and lower portions of the Po River Valley exceeded 8 billion cubic feet which is rapidly being made available to industrial and domestic consumers.

About 50 percent of Italy's oil production comes from properties operated by the Societa Petrolifera Italiana (SPI), controlled by the Standard Oil Company (N. J.) Group. The remainder of the production is from properties operated by Societa Idrocarbuni Nazionali, the Societa Petroli d'Italia, and Azienda Generale Italiana Petroli (AGIP), the latter an agency of the government. During the year the government announced that oil had been found in Northern Italy in large enough quantities to permit development exploitation. The find north of Parma was reported to have tested 214 barrels a day, but there have been no further reports or confirmations of this figure. It is known that the first well drilled in the area was producing about 120 barrels of distillate a day at the end of the year, but the well sands up and production is sporadic. The second well drilled came in as a gas producer and the third well was dry.

Gas discoveries held prominence during the year with AGIP drilling three wells 24 miles southwest of Milan which initially tested more than 5 million cubic feet combined. These wells blew out soon after completion and all were badly damaged. Recent efforts to repair the damaged producing sections were not successful.

Methane deposits in the Cortemaggiore gas field are reportedly capable of producing more than 3 million cubic feet a day, equal to 1/40 of Italy's national needs. The development of these deposits will be under the management and control of the state-owned AGIP.

The status of drilling operations during the year in the gas fields indicated four wells being completed in the Cortemaggiore field by AGIP, with three of these being straight gas producers and one the aforementioned distillate well. Production depths were about 5280 feet. Five drilling rigs were assigned to this area for 1950. The same company completed 16 gas wells in the Lodi field, but only one well is being produced because of inadequate outlet. Production depths in this field are about 5300 feet. Five drilling rigs were assigned to the area for 1950. Two productive gas wells were completed by AGIP at depths of 5300 feet in the Ripalta field. Four drilling rigs were assigned to the area for 1950 and one well was drilling below the gas horizon to seek possible oil production.

In Italy are four seismic, one gravimetric, and one magnetometric crews at work. This number will be increased to 12 during the summer of 1950 by contracts with foreign firms.

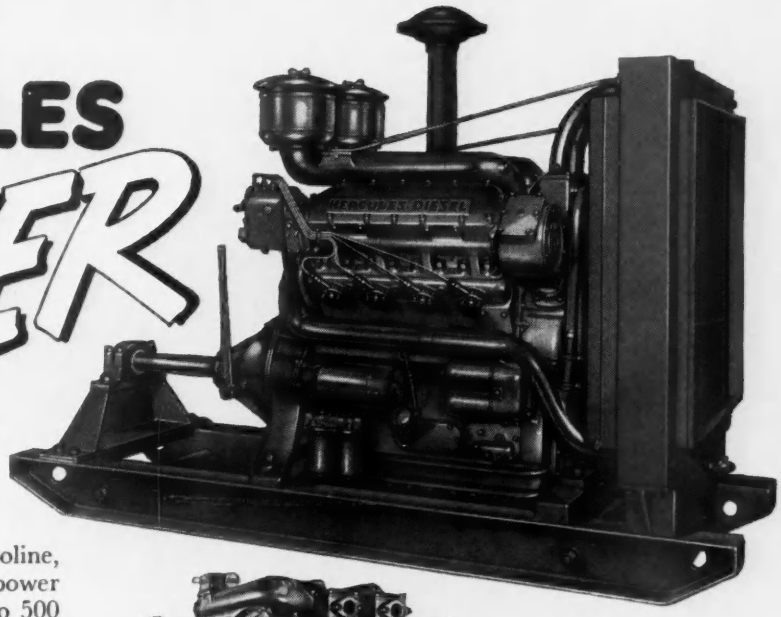
Natural gas pipe lines are being constructed to connect the Po Valley to the cities of Turin, Genoa and Milan. Total capacity of this gas grid will be 215 million cubic feet daily when completed, so the country anticipates still greater volumes of gas production than were made last year. While the above three cities will be the terminals of the system, the total number of towns to be served will be about 15. An 81-mile gas line was completed early in 1950 between Florence and Ferrara with a capacity of 1.7 million cubic feet.

Large refinery expansion will take place in Italy in the next four years with the throughput for 1949 of about 20 million barrels expected to increase to 51 million barrels for 1953. Inland consumption was about 22 million barrels in 1949 and is expected to be about 40 million barrels in 1953.

CUT DRILLING COSTS

with

HERCULES POWER



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Hercules gasoline and natural gas engines and power units are available in 15 series and 33 models from 3 to 240 horsepower. Hercules diesel engines and power units are built in 14 series and 30 models from 12 to 500 horsepower.

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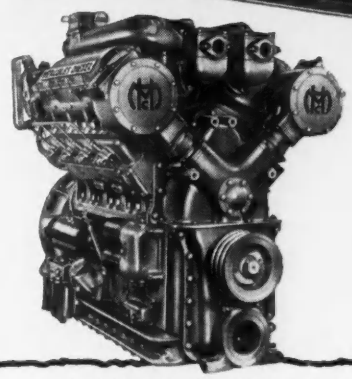
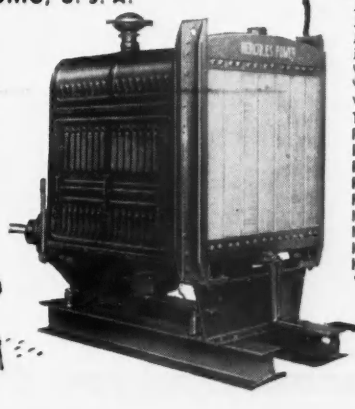


(Left) Front view of the base type model DNX-V8 Vee eight cylinder Hercules diesel engine used in the latest edition to the Hercules diesel line shown above. This power unit is available in four models offering piston displacements from 1247 to 1468 cu. ins. It is designed to introduce new economies to drilling operations.

HERCULES ENGINES

HERCULES MOTORS CORPORATION
CANTON, OHIO, U. S. A.

The model HXE gasoline or natural gas power unit shown at the right is one of four models in this series which have been popular in the oil field for a number of years. It develops 227 horsepower @ 2000. Piston displacement is 935 cu. ins.



HERCULES ENGINES 3 TO 500 H. P.

GAS AND GASOLINE ENGINES

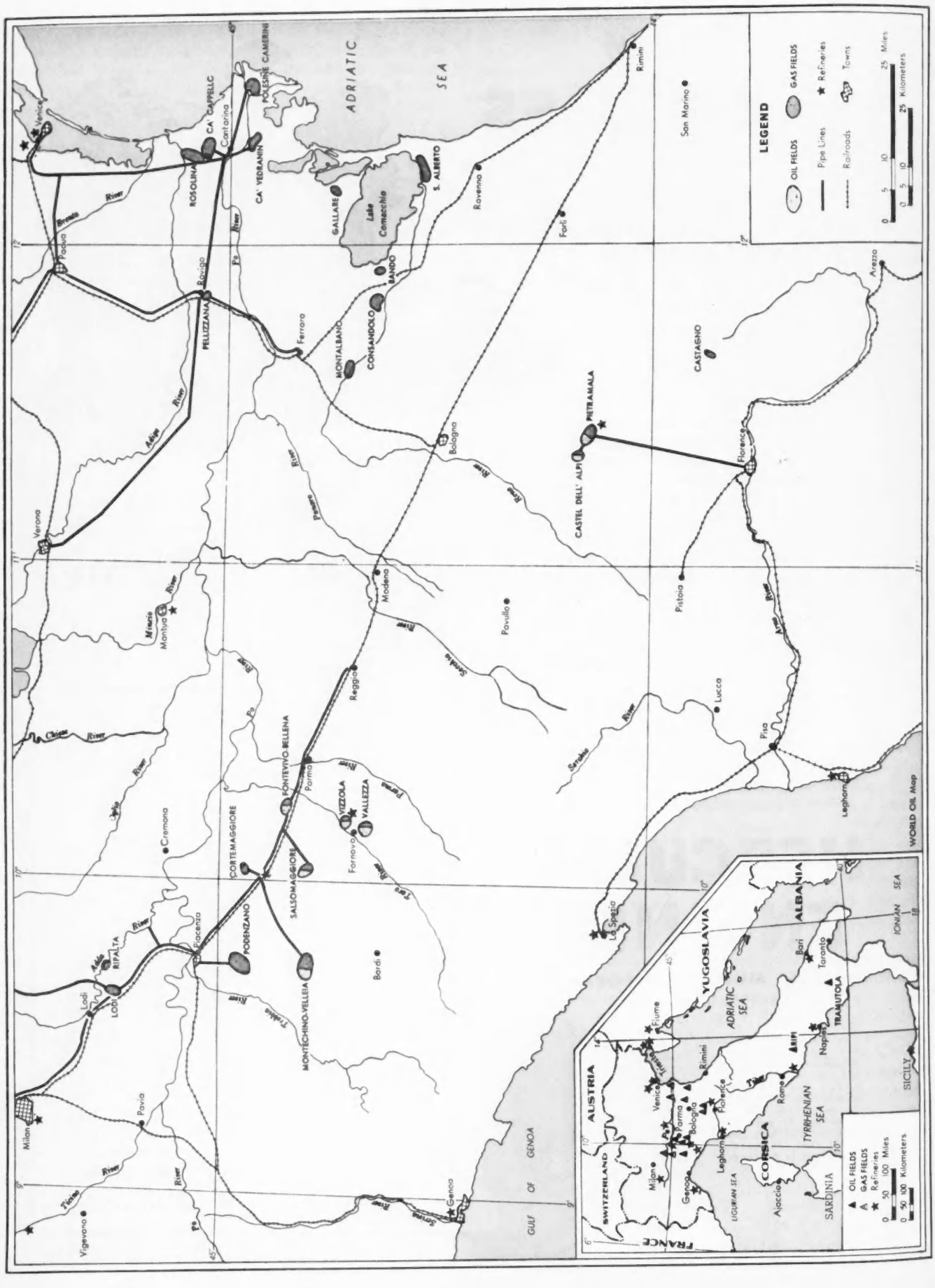
Model	Bore and Stroke	Cu. In. Displ.
Two Cylinder		
BXB	2 7/8" x 3"	39
NXA	3" x 4"	56.5
NXB	3 1/4" x 4"	66.3
Four Cylinder		
ZXA	2 1/2" x 3"	59
ZXB	2 5/8" x 3"	65
IXA	3" x 4"	113
IXB	3 1/4" x 4"	133
JX4E	3 1/2" x 4 1/4"	164
JX4C	3 3/4" x 4 1/4"	188
JX4D	4" x 4 1/4"	214
Six Cylinder		
QXA	3 1/8" x 4 1/8"	190
QXB	3 1/4" x 4 1/8"	205
QXC	3 3/8" x 4 1/8"	221
QXLD	3 7/16" x 4 1/4"	236.7
JXE	3 1/2" x 4 1/4"	245
JXB	3 5/8" x 4 1/4"	263
JXC	3 3/4" x 4 1/4"	282
JXD	4" x 4 1/4"	320
JXLD	4" x 4 1/2"	339
WXC-3	4 1/4" x 4 1/2"	383
WXLC	4" x 4 3/4"	358
WXLC-3	4 1/4" x 4 3/4"	404
TDXB	4 3/8" x 5 1/4"	474
RXB	4 1/2" x 5 1/4"	501
RXC	4 5/8" x 5 1/4"	529
RXLC	4 5/8" x 5 1/4"	529
RXLD	4 3/4" x 5 1/4"	558
RXLDH	4 3/4" x 5 1/4"	558
HXB	5" x 6"	707
HXC	5 1/4" x 6"	779
HXD	5 1/2" x 6"	855
HXE	5 3/4" x 6"	935
*HXE	5 3/4" x 6"	935

DIESEL ENGINES

Model	Bore and Stroke Inches	Piston Displ. Cu. In.
Two Cylinder		
DIXC	4" x 4 1/2"	113.1
DIXD	4 1/4" x 4 1/2"	127.5
Four Cylinder		
DIX4B	3 1/4" x 4"	133
DIX4D	3 5/8" x 4"	166
DOOB	3 3/4" x 4 1/2"	198.8
DOOC	4" x 4 1/2"	226.2
DOOD	4 1/4" x 4 1/2"	255
Six Cylinder		
DIX6D	3 5/8" x 4"	249
DJXB	3 1/2" x 4 1/2"	260
DJXC	3 3/4" x 4 1/2"	298
DJXH	3 3/4" x 4 1/2"	298
DJXHF	3 3/4" x 4 1/2"	298
DWXC	4" x 4 3/4"	358
DWXD	4 1/4" x 4 3/4"	404
DWXLD	4 1/4" x 5"	426
DWXLDF	4 1/4" x 5"	426
DRXB	4 3/8" x 5 1/4"	474
DRXC	4 5/8" x 5 1/4"	529
DFXB	5" x 6"	707
DFXC	5 1/4" x 6"	779
DFXD	5 1/2" x 6"	855
DFXE	5 5/8" x 6"	895
DFXH	5 3/4" x 6"	935
DFXHF	5 3/4" x 6"	935
Eight Cylinder		
DNX V-8B	5 3/4" x 6"	1247
DNX V-8C	6" x 6"	1348
DNX V-8D	6 1/4" x 6"	1468
DNX V-8DS	6 1/4" x 6"	1468

*Dual Carburetion

ITALY


LEGEND
OIL FIELDS
GAS FIELDS
Pipe Lines
Refineries
Railroads
Towns
0 5 10 25 Miles
0 5 10 25 Kilometers
ADRIATIC SEA
Venice
Rimini
San Marino
Ravenna
Forli
Ferrara
Bologna
Arezzo
Florence
Pistoia
Lucca
Pisa
Leghorn
Modena
Parma
Reggio
Verona
Mantua
Cremona
Piacenza
Pavia
Milan
Lodi
Bardi
Genoa
La Spezia
Vigevano
Padua
Rovigo
Contarina
ROSOLINA
CA' CAPPELLO
CA' VENDRAMIN
POLESINE CAMERINI
GALLARE
Lake Comacchio
S. ALBERTO
BANDO
MONTALBANO
CONSANDOLO
PELLIZZANA
CASTAGNO
CASTEL DELL' ALPI
PETRAMALA
RIPALTA
PODENZANO
SALSOMAGGIORE
CORTEMAGGIORE
PONTEVIVO-BELLENA
VIZZOLA
VALLEZZA
Fornovo
MONTECHINO-VELLEIA
Po River
Adige River
Brenta River
Panaro River
Secchia River
Taro River
Enza River
Chiese River
Oglio River
Serchio River
Arno River
Tiber River
Trebbia River
Tanaro River
GULF OF GENOA
LIGURIAN SEA
TYRRHENIAN SEA
IONIAN SEA
ADRIATIC SEA
AUSTRIA
SWITZERLAND
FRANCE
YUGOSLAVIA
ALBANIA
CORSICA
SARDINIA
SICILY
Fiume
Trieste
Naples
Bari
Taranto
TRAJUTOLA
RIPI
Rome
Ajaccio
OIL FIELDS
GAS FIELDS
Refineries
0 50 100 Miles
0 50 100 Kilometers
WORLD OIL Map

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HOUMA, LA.
HOUSTON, TEXAS
KERMIT, TEXAS
KILGORE, TEXAS
LAKE CHARLES, LA.
LAUREL, MISS.
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NATCHEZ, MISS.
NEW IBERIA, LA.
ODESSA, TEXAS
OKLAHOMA CITY, OKLA.
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THE WORLD'S LARGEST INDEPENDENT OIL WELL SUPPLY COMPANY

THE NETHERLANDS

CRUDE production in The Netherlands was 4,285,395 barrels in 1949 as compared with 3,444,000 barrels in 1948—all from the Schoonebeek field. Production from the field is not expected to increase because the 79 wells now producing are being held at their most efficient rate. Drilling in the field proper has just about been completed with only 3000 feet of hole being drilled during 1949 as compared with 41 wells completed in 1948 for a total of 118,720 feet.

The Schoonebeek field, largest in Western Europe, is owned by N. V. Nederlandse Aardolie Maatschappij, a joint company composed 50 percent of the Standard Oil Company (N. J.) Group and 50 percent of Royal Dutch Shell Group, the operator.

Outside of the field proper some drilling is being done. A new producing possibility was found near Dalen at about 2840 feet and more drilling will be done there in the future. No deep drilling is now being carried on in the country, but another successful strike during 1949 occurred at the Dutch-German border which is an extension of the German Ruehlertwist field. About 25 miles west of the Schoonebeek field a gas discovery was made at De Wijk.

Production from Schoonebeek is moved by railroad tank cars 125 miles to the refinery at Pernis near Rotterdam. A petro-chemical plant was completed near the refinery in 1949 by the Shell Group. The plant was a part of the group's $45 million postwar construction program in the Pernis-Rotterdam area and will produce synthetic detergents and plastics.

Geophysical work in The Netherlands began in 1935 and has developed several good potential productive areas, notably in the municipalities of Schoonebeek, Coevorden, Dalen, Emmen, Sleen and Gramsbergen. Although the Schoonebeek field is practically all developed, exploratory work is expected to continue in the above areas.

Data on Schoonebeek Field

Operating Company	*N. V. Nederlandse Aardolie Maatschappij
Year of Discovery	1943
Producing Wells End of 1949	94
Wells Completed in 1949—Oil	18
Dry	2
Total	20
Field Wells Drilling End of 1949	1
Footage Drilled During 1949	54,787
Production in 1949	4,315,600
Cumulative Production to End of 1949	9,727,300
Daily Production at End of 1949	11,700
Estimated Proved Area of Field	2,700 acres
Gravity of Oil (API)	24.8
Producing Formation—Local Name	Valanginian
Kind	Sand
Age	Lower Cretaceous
Minimum depth to top of pay	2500 feet
Maximum depth to bottom of pay	2650 feet
Average thickness of pay	80 feet
Type of Structure	Anticline

* Owned 50 percent by Standard Oil (New Jersey) and 50 percent by Shell. Properties managed by Shell.

POLAND

PETROLEUM activities in Poland are now given as percentage gains or losses over previous years much the same as other countries dominated by Russia. Operations for 1949 were outlined in general terms by a Polish Government publication, *NAFTA*, which said: drilling was up 20 percent during 1949. This would indicate that 150 new wells were drilled in all categories. As the country has about 85 rigs in actual operation most of the time, it would indicate that most of the drilling was on shallow development wells to about 2500 feet.

New oil sources were not found to any great extent and the development drilling in settled areas did not keep apace of the natural field decline in production. This is an assumption based upon *NAFTA's* lengthy discussion on the necessity of revising previously accepted rates of normal decline. Where settled production had previously been given a normal rate of decline of 13.6 percent, *NAFTA* indicated that new information would show that this decline was actually higher.

Poland's oil needs will be fulfilled to a large extent by imports from Great Britain and Russia in the next five years. A trade agreement made in 1949 would direct some of Britain's surplus to Poland.

The expansion of the natural gas pipe line facilities in Poland is anticipated in a new six-year plan. The Natural Gas Trust intends to build lines to Warsaw, Kielce, Lublin, Cieszyn, Zywiec, Krynica and Grzybow.

Refinery operations during the next six years encompass reconstruction and development of present producing installations. Stress is being laid on construction of facilities to produce more lubricants rather than more gasoline, which Poland claims is easily synthesized.

ROUMANIA

ROUMANIA'S nationalized petroleum industry had set a goal of 32 million barrels for 1949 and an increase by 48 percent in drilling operations. By mid-1949 the Bucharest radio announced that the industry did not meet its goals in the first two quarters and there is little reason to believe it met the year's quotas. Nevertheless, Roumania's total production of about 29 million barrels still leaves it as one of the most important oil producers in Europe.

The Communist dominated government has clamped strict censorship on all Roumanian activities, but there is little doubt that Russia continued to bleed the country of about 60 percent of her oil production as war reparations. The remaining 40 percent is less than one-half of Roumania's prewar demand.

Operations in Roumania are controlled by two "centers" set up to run the Ploesti and Moldova fields. These so-called centers are in effect administrative setups programming and directing production, drilling, transportation and marketing of oil in Roumania. In addition to the centers, the Sovompetrol group operates outside of the system. The Sovompetrol is supposedly a joint group made up of half Russian and half Roumanian interests, but it is actually dominated by the Russians and is not subject to controls of the centers.

Since the confiscation of properties belonging to the Shell and Standard Oil Company (N. J.) groups in Roumania the country had placed an order for $11 million of oil field equipment with the U. S. About $1.5 million of the order had been shipped before export licenses were denied the remainder. Lack of equipment and replacement parts was largely responsible for Roumania's admitted drop in production and drilling activities during 1949.

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U. S. S. R.

SOVIET Russia's petroleum production has been an unknown quantity for several years for those countries outside the orbit of the Iron Curtain. As all figures are given to the outside world in percentage gains over the previous year, only an estimated production figure is available to the oil industry. According to Russian publications, the petroleum production goal for 1949 was to exceed the 1948 production by 12.3 percent and the goal set for the end of 1949 was to be 675,000 barrels daily.

Using this percentage figure and the reported production for 1948 of 218 million barrels, the production during 1949 would have been in the neighborhood of 245 million barrels or 671,000 barrels daily . . . close to the Five-Year Plan goal. However, there is no indication that the goal was reached judging from the severe criticism directed at the Russian oil workers by the Soviet Minister of the Oil Industry. From the figures available outside Russia the total production for 1949 is thought to have amounted to about 233.6 million barrels or

Engineering and Geological Data on U. S. S. R. European Fields

AREA and FIELD	PRODUCING FORMATION Age	Depth. (Ft)	Type Structure
Baku (Azerbaijan) Area:			
Artem (Holy Island)	Middle and Lower Pliocene	3500–9000	Anticline Fold
Baladzhary	Lower Pliocene	4729	Anticline
Bibi Eibat	Middle Pliocene	3500–5000	Anticline
Binagady	Lower Pliocene	1500–3116	Anticlinal Fold
Fatmay	Upper Pliocene	1788	Anticline
Kala	Upper to Lower Pliocene	2800–4200	Dome on Fold
Kara-Chkhur	Middle to Lower Pliocene	3440–9000	Anticline
Kara Dag	Middle Pliocene	5340	Anticlinal Fold
Kergez-Kyzyl Tepe	Middle Pliocene	.....	Anticline
Lenin (Balakhany, Sabunchy, Ramany)	Upper to Lower Pliocene	3800–5184	Anticline
Lok-Batan (Mikoyan)	Middle Miocene to Upper pliocene	.....	Anticlinal Fold
Mahomedly	Upper pliocene	.....	Anticline
Mindjik	Middle Pliocene	Shallow	Anticline
Nephte Chala	Pliocene	.....	Folded Fault
Peschanny	Middle to Lower Pliocene	.....	Anticline
Pirsagat	Middle Pliocene	4120	Anticlinal Fold
Puta (Molotov)	Middle Pliocene	.....	Anticlinal Fold
Sarynchа-Guilbakht	Middle Pliocene	.....	Anticlinal Fold
Shongar	Middle Pliocene	.....	Anticlinal Fold
Shuraabed	Oligocene	Shallow	Overthrust Fold
Shubany (Atashka)	Lower Pliocene	.....	Diapir Fold
Sion Shor	Lower Pliocene	5180	Anticlinal Fold
Siazan	Cretaceous and Oligocene	.....	Overthrust Fold
Surakhany	Upper to Lower Pliocene	3800–5200	Anticline
Sulu Tepe	Lower Pliocene	5200	Anticlinal Fold
Zykh (Beriya)	Middle and Lower Pliocene	.....	Anticlinal & Dome
Carpathian Area:			
Bitkow	Oligocene	3610	Anticline
Boryslaw	Oligocene (Eocene, Cretaceous)	4270–5700	Folds
Czarna	Oligocene	1310	Anticlinal Fold
Daszawa	Miocene	2300	Anticline
Kosmacz	Cretaceous	1920	Anticline
Lipic	Oligocene	1310	Anticline
Lodyna	Oligocene	1150–1900	Diapir Fold
Majdan	Eocene	590–1650	Anticline
Nahujowice	Oligocene and Eocene	535– 656	Anticline
Opaka	Eocene	1970	Anticline
Orow	Cretaceous	300–1835	Fold
Perehinsko	Oligocene	2625	Anticline
Polana	Oligocene	325– 685	Anticline
Rajskie	Oligocene	980–1300	Asymmetrical Fold
Rypne	Oligocene	400–3700	Fold
Schodnica-Urycez	Cretaceous	1480	Anticline
Slobada-Rungurska	Cretaceous	400–1000	Anticline
Strzelbice	Cretaceous	660	Anticline
Crimea Area:			
Chongelek	Middle Miocene	.....	Diapir Fold
Feodosiya	Middle Miocene	.....	Anticlinal Fold
Daghestan Area:			
Achi Su	Middle Miocene	985–2300	Anticlinal Fold
Berekei	Oligocene & Eocene Contact	.....	Domal Uplift
Dag Ogni	Oligocene	60–1000	Domal Fold
Duzlak	.....	.....	Dome
Isber Bash	Middle & Lower Miocene	3025–4685	Domal Anticline
Kaia Kent	Middle Miocene	655–1640	Anticline
Emba Area:			
Baichunas	Jurassic	.....	Salt Dome
Chernaya-Retchka	Jurassic	Shallow	Salt Dome
Dossor	Jurassic	246– 690	Faulted Dome
Dshaksymai	.....	.....	Faulted Dome
Iskine	Jurassic-Salt Core Contact	2195	Salt Dome
Koschaghyl	Jurassic	350–1200	Salt Dome
Kulsary	Jurassic	.....	Salt Dome
Makat	Jurassic	.....	Salt Dome
Novobogatinsk	Jurassic	.....	Salt Dome
Sagis	Lower Cretaceous & Middle Jurassic	328–2132	Faulted Dome
Shobarkuduk	.....	.....	Salt Dome

AREA and FIELD	PRODUCING FORMATION Age	Depth. (Ft.)	Type Structure
South Georgian Area:			
Malye Shiraki	Lower Pliocene & Upper Miocene	980–7850	Anticlinal Fold
Mirzaani	Lower Pliocene & Upper Miocene	980–7850	Anticlinal Fold
Grozny Area:			
Akhazovski	Middle Miocene	.....	Folded Overthrust
Ali Yurt	Middle Miocene	9185	Overthrust Fold
Bakovichi	Middle Miocene	.....	Anticline
Groskaya Mountain	Middle Miocene	3530	Fold Anticline
Grozny, New (October)	Middle Miocene	7220–10200	Anticline
Grozny, Old	Middle Miocene	7220–10200	Folded Anticline
Gudermes	Middle Miocene	3840–4595	Anticline
Gunuski	Middle Miocene	4315	Anticline
Makhkety	Middle Miocene	3280–3940	Anticline
Malgobek	Middle Miocene	990–2300	Anticlinal Fold
Pravoberezhnoye	.....	.....	.....
Voznessenka	Middle Miocene	990–2300	Anticlinal Fold
Kama River Area:			
Krasnokamsk	Permian & Upper Carboniferous	2950–3100	Anticline
Overiata	Permian & Upper Carboniferous	.....	Anticline
Polazna	Permian & Upper Carboniferous	3400	Anticline
Severokamsk	Permian, Upper Carboniferous & Devonian	3200–5840	Anticline
Shilovo	Permian	3152	Anticline
Verkhne-Chusovskiye Gorodki	Permian	3200	Buried Reef
Kuban-Maikop Area:			
Abuzy	Oligocene	2500–4920	Monocline
Adaghum	Upper Miocene	985	Diapir Fold
Asphalt Mountain	Lower Miocene & Oligocene	2240–2950	Monocline
Olsk	Oligocene	.....	Monocline
Kalujsky	Middle Miocene	.....	Monocline
Keslerovo-Varenikovo	Upper Miocene & Oligocene	1148–1640	
		2625–3280	Diapir Fold
Khadyzhensky	Oligocene	2240–3480	Monocline
Krymsky-Kudako	Middle Miocene	650–1640	Anticline
Kura-Tsite	Lower Miocene & Oligocene	2250–2950	Monocline
Kutaiss	Lower Miocene & Oligocene	2240–2950	Monocline
Maikop (Apsheron)	Lower Oligocene	1640–3480	Monocline
Sepsi	Oligocene	.....	.....
Shiraky	Lower Miocene & Oligocene	2240–2950	Monocline
Suvorov-Cherkess	Pliocene & Miocene	330–1475	Domal Uplift
Wax Mountain	.....	.....	.....
Pechora Area:			
Ukhta (Chibien, Ust Kulom, Yareg, Izhma, Cherdin)	Devonian	.....	Anticline
Saratov Area:			
Dergachi	Upper Pliocene	383–3300	.....
Kurdium	Upper Pliocene	1716	.....
Teplovka	Upper Pliocene	1320	.....
Yelshanka	.....	.....	.....
Ukraine Area:			
Melitopol	Mesozoic	.....	Salt Dome
Poltava	.....	.....	Salt Dome
Romny	Mesozoic	.....	Salt Dome
Ural-Volga Area:			
Allaguvatovo	Lower Permian	1650–2085	Buried Reef
Buguruslan	Permian	985	Anticlinal
Buranchino	Lower Permian	1640–2085	Buried Reef
Ishimbaevo	Lower Permian	1640–2085	Buried Reef
Kusiankul	Lower Permian	1380–2490	Buried Reef
Kuzminovka	Lower Permian	.....	Buried Reef
Shugarov	.....	.....	.....
Smakaevo	Lower Permian	.....	Diapir Fold
Syzran	Upper & Lower Carboniferous	2130–3280	Domal Uplift
Termen-Yelga	Lower Permian & Devonian	2750	Reef
Tuimaza	Carboniferous	3440–3775	Buried Reef
Yablonovo (Stavropol)	Upper & Lower Carboniferous	2130–3280	Domal Uplift

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U. S. S. R.—Continued

640,069 barrels daily. This is a 7.5 percent increase over the 1948 production and probably more in line with actual conditions.

The Baku (Azerbaijan) area had been singled out to make about half the production for 1949 or 119 million barrels; however, there is little doubt that this section did not live up to expectations judging from a governmental blast at the workers' non-fulfillment of their quota. The other major areas of Russian production, including Maikop, Grozny, Daghestan, Ural-Volga and Sakhalin were expected to produce about 101.5 million barrels during 1949 and they probably exceeded this goal slightly.

Drilling operations were to have increased 58 percent in 1949 over 1948 but reports of stoppages, breakdowns and shortages of materials indicate the goal was abandoned. Workers, technicians and manufacturers of heavy machinery were exhorted to double their efforts and output during the last half of 1949, which is indicative of the failure of this program.

Engineering and Geological Data on U.S.S.R. Asiatic Fields

AREA and FIELD	PRODUCING FORMATION Age	Depth, (Ft.)	Type Structure
Eastern Siberia Region:			
Ust Maya			
Sakhalin Island:			
Ekhabi	Upper Pliocene	310– 630	Anticline
Katangli	Upper Pliocene	2460	Anticline
Nutovo	Upper Pliocene	260–2885	Anticline
Okha	Upper Pliocene	300– 775	Anticline
Poromay	Middle & Lower Pliocene	8858	Anticline
Wigrek	Upper Pliocene	120– 220	Anticline
Turkmen Area:			
Cheklishlyar	Middle Pliocene		
Cheleken	Pliocene		Faulted Dome
Mangshlak			
Neuit-Dag	Middle Pliocene	820	Anticline
Neftedag	Upper & Middle Pliocene		Anticline
Uzbek-Tadzhik-Kirgiz (Fergana) Area:			
Ak-Mecket	Eocene		Anticline
Andizhan			Anticline
Barzik			Anticline
Changirtash			Anticline
Chimmon	Eocene	1000	Anticline
Chu			Anticline
Dzhar-Kurgan			Anticline
Encumimsai			Anticline
Eno-Sing			Anticline
Kamishbashi			Anticline
Kanabad-Sai			Anticline
Kaudag	Oligocene	528	Anticline
Kim (Sel Rokho)	Eocene		Anticline
Kirovabad			Anticlinal Fold
Komosol			Anticline
Kulmen			Anticline
Mailisai			Anticline
Melnikovo			Anticline
Mamangan			Anticline
Nefteabad			Anticline
Pavlan-Tash			Anticline
Pitaussi			Anticline
Ristansanto			Anticline
Shor-Su (Kagnovich)	Eocene	650	Anticline
Tekebel			Anticline
Uch Kyzyl (Termez)			

Refineries of U.S.S.R.

LOCATION	Crude Charging Capacity (Bbls. Daily)	Cracking Capacity (Bbls Daily)	Type of Refinery
European Refineries:			
Baku (5 Refineries)	375,000	50,000	Skim-Crk.
Batumi	2,000	.....	Skim.
Berdyansk	.....	5,000	Crk.
Boulova	.....	.....	.....
Burguruslan	.....	.....	.....
Chelyabinsk	.....	.....	.....
C. Gorodki	28,000	5,000	Skim-Crk.
Drohobycz[1] (4 Refineries)	3,000	1,000	Complete
Gleboka (Sambor)[1]	100	.....	Skim.
Gorki	.....	10,000	Cracking
Grozny (3 Refineries)	150,000	50,000	Skim-Crk.
Gurev	1,000	.....	Skim.
Ishimbaevo	9,000	.....	Topping
Iskine	.....	.....	Topping
Kazan	.....	.....	.....
Kherson	.....	5,000	Cracking
Krasnodar (Maikop)	25,000	.....	Skimming
Kuibyshev	.....	.....	.....
Leningrad	.....	5,000	Cracking
Makhach Kala	2,000	.....	Skimming
Molotov (Perm) (2 Refineries)	12,000	4,000	Skim-Crk.
Moscow	.....	12,800	Cracking
Munkacs[2]	420	.....	Skimming
Nadworna[1]	200	.....	Skimming
Nebit Dag	.....	.....	.....
Nikolaev	.....	.....	.....
Novobogatinsk	500	.....	Skimming
Odessa	.....	5,000	Cracking
Orsk	28,000	5,000	Skim-Crk.
Saratov	.....	35,000	Cracking
Sernovo	.....	.....	.....
Stalingrad	.....	.....	.....
Sterlitmak	15,000	.....	Skimming
Stryj[1]	250	.....	Skimming
Syzran	.....	.....	.....
Tbilisi (Tiflis)	.....	.....	.....
Tuapse	35,000	10,000	Skim-Crk.
Tuimaza	.....	.....	.....
Ufa	28,000	5,000	Skim-Crk.
Ukhta	.....	.....	Topping
Ustrzyl i Dolna[1]	1,000	.....	Skimming
Yaroslavl	9,000	4,000	Skim-Crk.
Zniesienie (Lwów)[1]	1,000	.....	Skim-Lube
Asiatic Refineries:			
Fergana (4 Refineries)	40,000	10,000	Skim-Crk.
Irkutsk	.....	.....	.....
Khabarovsk	4,500	3,500	Skim-Crk.
Komosomolsk	4,500	3,500	Skim-Crk.
Krasnovodsk	4,000	3,000	Skim-Crk.
Krasnoyarsk	.....	.....	.....
Moskalvo	.....	.....	Topping
Nikolaevsk	4,500	3,500	Skim-Crk.
Vladivostok	.....	.....	.....

[1] Refineries located in former Polish territory.

[2] Refinery located in former Czechoslovakian territory.

YUGOSLAVIA

A SLIGHT increase over 1948 production was expected in Yugoslavia and the output for 1949 was probably in the neighborhood of 380,000 barrels for a daily figure of 1040 barrels.

Yugoslavia recently signed a trade agreement with Great Britain whereby the former would get crude imports amounting to 4000 barrels daily in 1950, 3000 barrels daily in 1951, and 2000 barrels daily in 1952 through 1954. Yugoslavia's present refinery capacity is about 8100 barrels daily and judging from the decreasing amounts of imports over the above five-year period the country apparently expects a marked increase in production.

Drilling equipment and refinery supplies were purchased from the U. S. during the year and an active exploration program will probably be in progress soon. The country's goal of 9250 barrels a day for the end of 1951 is not likely to be reached unless some unusually good discoveries are made.

Yugoslavia was also negotiating with an American firm for the construction of a 100-mile natural gas pipe line which would probably handle production from the Bujavica-Kutina area.

The construction of a new carbon-black plant near Bakar was completed during the year and this plant together with existing facilities at Kutina are said to be sufficient for Yugoslavia's domestic needs for the product.

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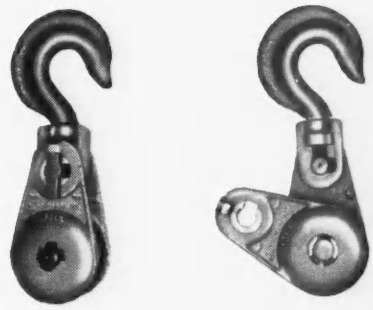

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ALGERIA

EXPLORATION for petroleum continued in the Cheliff Basin in Northern Algeria during 1949 and a new section, the Hodna Basin, developed oil production in the Eocene at 1000 and 2000 feet. All petroleum operations are carried on by a joint French and Algerian company known as the Societe Nationale de Recherche et d'Exploitation des Petroles en Algerie (SN. REPAL).

Algeria's oil production has come from two small fields, the Ain Zeft and the Tlioуanet, both now shut down. New production found in the Hodna Basin contributed 2200 barrels of oil to Algeria's total production of 254,070 barrels as of January 1, 1950. The Hodna wells were shut in immediately after testing pending the construction of a small refinery at Aumale southwest of Algiers.

The extent of exploratory drilling in Algeria during the year indicated the country was interested in developing its petroleum resources. Twenty wildcats were drilled, five of them being in the Cheliff Basin and the remainder in the Hodna Basin. Drilling in the Cheliff area resulted in additional geological information pointing to possible production in new structures but no commercial amounts of oil were found. There is no indication of the potentials of the Hodna wells but they are considered to be good enough to justify the building of a refinery.

The 20 tests completed in 1949 involved the drilling of 43,350 feet of hole. In contrast, six wildcats representing a total of 29,200 feet were completed in 1948.

EGYPT

EGYPT'S production did not fall off in 1949 as was expected because of the country's new petroleum law. Actually, a new high was reached with 15,808,221 barrels being produced during the year, an increase of 20 percent over 1948 production. Government control was expected to increase and some foreign companies were expected to drop out of operations in Egypt.

The gain in production was due to a large increase in the Sudr field's output and the important discovery of the Asl field. The latter was located in 1947 and developed in 1948 but no production was recorded for the field before 1949 when five wells produced 1,671,684 barrels of oil. Both fields are operated by the joint company formed by the Anglo-Egyptian Oilfields, Ltd., and Socony-Vacuum Oil Company as equal partners. The Sudr field, discovered in 1946, is on the Sinai Peninsula, 35 miles south of Suez, and the Asl field is about ten miles south of the Sudr. Capacity of the Sudr field can be determined by the fact that only six wells produced 5,447,652 barrels of oil during 1949. Four wells are presently shut in.

Discovery of the Asl field was thought to have made Egypt a major oil producing country. The third well drilled in the field actually tested at a rate of 39,000 barrels per day and caused government officials to predict that the field would eliminate the petroleum import deficit. The well when properly hooked up and tested over a longer period of time than the initial preliminary test did not produce this much oil and company officials lost some of their early optimism. Geologically, the Sudr and Asl fields in the Suez graben are in a territory of stratigraphic unconformities and the extent of oil accumulation may be somewhat less than was originally

Drilling and Geological Data on Egypt Fields

FIELD	WELLS COMPLETED IN 1948				WELLS COMPLETED IN 1949				Wells Drilling End of 1949	Gravity Oil (API)	PRODUCING FORMATION					
			Total				Total				Kind	Age	DEPTH (Feet) Minimum to Top of Pay	DEPTH (Feet) Maximum to Bottom of Pay	Average Thickness of Pay (Feet)	Type of Structure
	Oil	Dry	Wells	Footage	Oil	Dry	Wells	Footage								
Asl	...	...	...	.....	4	2	6	26,581	1	14-22	Lime & Sand	Miocene & Eocene	2873	3870	....	Anticline
Gemsa (abnd.)	...	...	...	.....	...	...	...	.....	...	23	Lime	Miocene	400	2000	100	Anticline
Ras Gharib	3	...	3	10,090	1	...	1	.....	...	25-26	Sand	Carboniferous	1600	2500	400	Faulted
											Sand	Cretaceous	1600	2000	75	Monocline
											Lime	Miocene	1200	1900	300	.....
Ras Hurghada	1	2	3	10,091	...	4	4	14,721	1	22-24	Conglomerate & Sand	Miocene & Cretaceous	700	2500	100	Anticline
Ras Matarma	...	...	...	.....	1	2	3	12,669	...	19	Sand	Miocene	1940	2120	....	Anticline
Sudr	6	2	8	21,291	1	2	3	15,859	...	22-24	Lime & Sand	Basal Miocene & Eocene	2650	3100	....	Anticline
Wildcats	2	4	6	37,404	...	...	...	.....	...	...	.....	.....	....	....	....	.....
Total	12	8	20	78,876	7	10	17	69,830	2	...	.....	.....	....	.....	....	.....

Oil Production and Producing Wells in Egypt

FIELD	OPERATING COMPANY	Year of Discovery	Proven Area (Acres)	PRODUCING OIL WELLS END OF 1949 Shut in Oil Wells	Flowing	Art. Lift	Total Producing	CRUDE OIL PRODUCTION—(Barrels) Daily At End of 1949	Year 1948	Year 1949	Cumulative Through 1949
Asl	Anglo-Egyptian Oilfields 50%; Socony-Vacuum Oil Co. 50%	1948	200	1	5	.....	5	6,012	.....	1,671,684	1,671,684
Gemsa (abnd.)	Anglo-Egyptian Oilfields, Ltd	1908	40	1	...	...	...	...	...	...	1,420,000
Ras Gharib		1938	1000	44	21	58	79	22,142	9,332,867	8,372,038	86,804,385
Ras Hurghada		1913	500	22	.....	19	19	727	340,584	316,847	37,645,431
Ras Matarma		1948	40	....	....	....	....	.....	.....	.....	.....
Sudr	Anglo-Egyptian Oilfields 50%; Socony-Vacuum Oil Co. 50%	1946	240	4	6	.....	6	15,457	3,499,197	5,447,652	9,065,155
Total	.....	.....	2020	72	32	77	109	44,338	13,172,648	15,808,221	136,606,655

EGYPT—Continued

predicted. Production from the Asl field did not have an outlet until 1949 when a 12-mile, six-inch pipe line was completed to the Sudr terminal on the Gulf of Suez. The terminal has a storage capacity of 60,000 barrels and a 12-inch underwater loading line. Sudr production comes to the terminal through a six-mile, six-inch line from the field.

One drilling rig was operating in the Sudr field and one in the Asl. Another rig was drilling in the Ras Matarma area, between the two fields, which has not yet recorded any production. A fourth drilling rig was operating for Anglo-Egyptian at Nebwi, immediately south of the Asl field, and Socony-Vacuum was drilling a well south of this in the Lagia area, where good oil shows have been reported. About 50 miles south of Asl, Standard Oil Company of Egypt reported an oil strike at Wady el Feiran early in 1949. Shortly after this find, however, the company suspended exploratory operations because of the existing political situation.

The Sudr and Asl fields were found on the basis of results obtained through surface geology and gravimetric work. Seismograph work has been carried on in the area by Socony-Vacuum but little valuable information was gained by this work. Anglo-Egyptian Oil Company is carrying on gravity work and Standard Oil Company of Egypt did have gravity, seismograph and magnetometer parties in the Suez area.

Seventeen oil wells were drilled in 1949 by all operators for a total of 69,830 feet, a slight decrease from the 1948 figure for this work. Seven of these completions were oil productive.

Politically, Egypt is not now encouraging exploitation of petroleum by outside operators. A new petroleum law imposes rather rigid government control over the industry by prohibiting crude exports and stipulating that the government shall have a controlling interest in refineries to be built in the future. Restrictions have also been placed on the size and shape of future oil concessions; rentals and royalties have been increased; and a continuous drilling clause prevents normal evaluating work between drilling operations. Representatives of the three companies interested in Egyptian operations last year conferred with government officials in an effort to get some of the regulations modified. Following these talks Standard of Egypt withdrew from the country completely and was in the process of disposing of physical assets early in 1950. The other two companies have remained in the country and are believed to be more optimistic about the possibility of a softening in the government's attitude.

The Egyptian government entered the petroleum business actively this year with the formation of the National Petroleum Company of Egypt. The company has taken up 267,000 acres of concessions on both sides of the Gulf of Suez and on the Sinai Peninsula proper. Drilling operations will also be carried on at Sollum near the northwestern frontier and in the Fayoum area south of Cairo.

ETHIOPIA

ETHIOPIA'S first wildcat well was spudded early in 1949 by Sinclair Petroleum Company, holding exclusive oil exploratory rights in the country, and was abandoned as a dry hole below 10,000 feet in April of this year. A second deep test will be drilled as soon as a likely site is developed from surface geological work now being carried on in the Ogaden Desert in Southeastern Ethiopia. Sinclair has indicated that a long term exploratory program will be carried on in the country, and the present work is only preliminary preparation for additional drilling to follow.

The company's first well, Gumburo 1, located 250 miles by air southwest of the town of Dire Dawa, was drilled slowly to insure good recovery of cores and samples so that the general stratigraphy of the region could be ascertained. Upon completion of the well, the drilling personnel was furloughed to the U. S. to await the completion of geological, seismic and magnetometer work now going on in a 25,000 square mile area of the Ogaden Desert. Initial ground work had been sporadic in 1948 due to unruly tribesmen in the area disrupting operations, but this problem is now under control.

The Ogaden region under consideration is about the size of Kansas and is practically uninhabited except for scattered nomadic tribes. Sinclair built a camp near the first well site which houses about 60 Americans and more than 100 Ethiopian nationals. The only outlet from the camp to Dire Dawa, the nearest town, is by air or a 475 mile winding road through the sand and bush country. The heavy equipment for the drilling operations and the camp was brought in over this road by truck.

MOROCCO

THE Oued Beth field, Morocco's only substantial producer, lived up to early 1949 predictions of doubling its daily production by the end of the year. Production exceeded that of 1948 by 48,670 barrels, but Morocco still has not fulfilled her own needs.

Forty-four wells were drilled in the Oued Beth field during 1949 with 11 of them finding oil production. These wells can be classified as wildcats as the field has not yet been accurately outlined and no well seems to conform with the previous ones. Twelve other exploratory wells were drilled during the year in Rharb Plains with five having shows of gas. Total

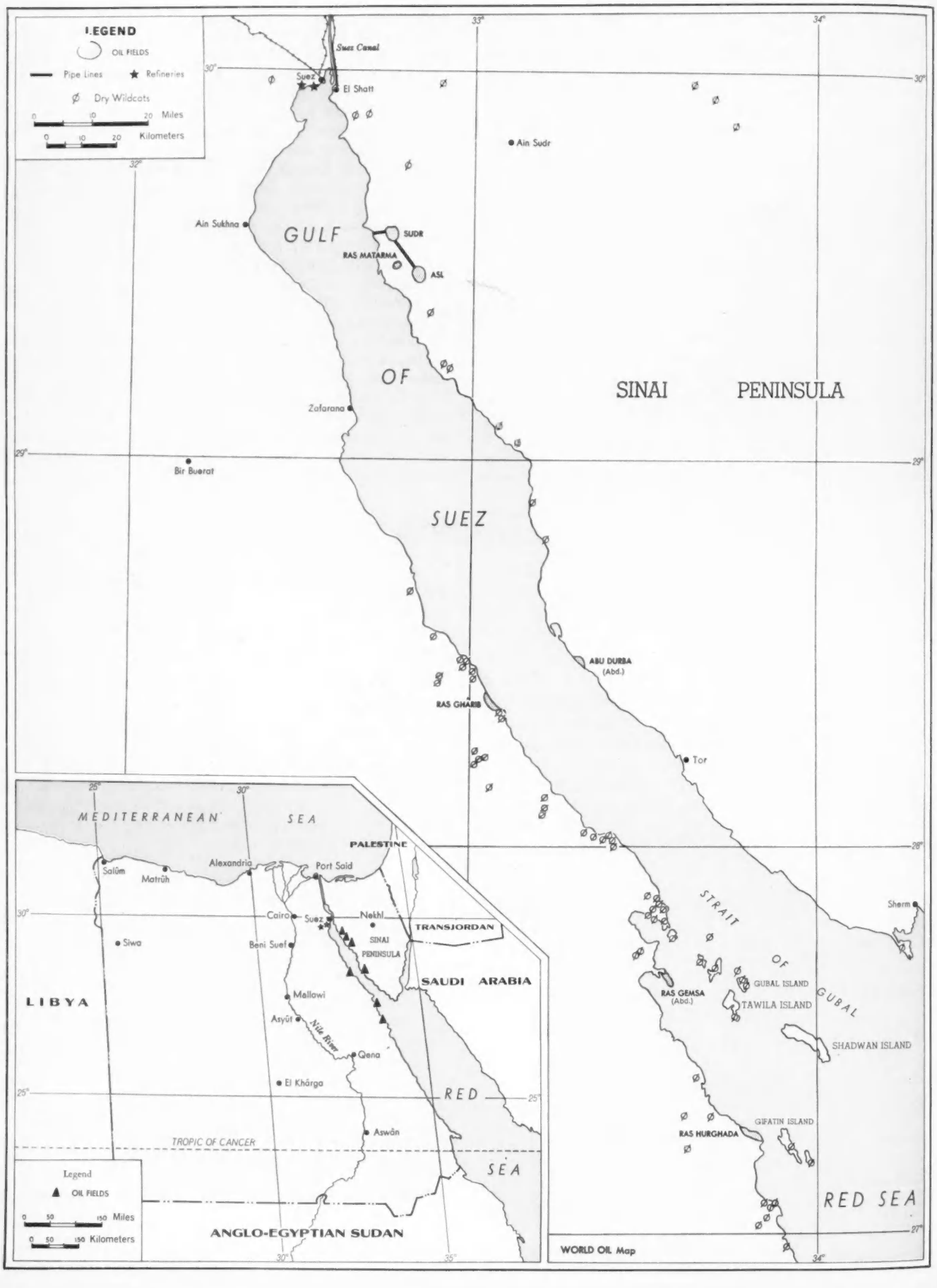
Drilling in Morocco

REGION and FIELD	WELLS COMPLETED IN 1948 Oil	Dry	TOTAL Wells	Footage	WELLS COMPLETED IN 1949 Oil	Dry	TOTAL Wells	Footage	Wells Drilling End of 1949
PORT LYAUTEY:									
Oued Beth	3	38	41	130,500	11	33	44	141,000	1
Wildcats	...	16	16	43,950	...	12	12	75,240	...
Total	3	54	57	174,450	11	45	56	216,240	1

Pipe Lines in Morocco

COMPANY	Origin	Terminus	Length (Miles)	Diameter (Inches)	Capacity (Bbls. Daily)	Year Completed
Société Chérifienne des Pétroles	Bou Draa	Petitjean	1	2	280	1940
	Tselfat	Petitjean	12.3	2	280	1938
	Ain Hamra	Karia (railway)	2.3	2	150	1943
Total	3 lines		15.6		710	

EGYPT


LEGEND
OIL FIELDS
Pipe Lines
Refineries
Dry Wildcats
Miles
Kilometers
Suez Canal
Suez
El Shatt
Ain Sudr
Ain Sukhna
GULF
SUDR
RAS MATARMA
ASL
OF
SINAI PENINSULA
Zafarana
Bir Buerat
SUEZ
ABU DURBA
(Abd.)
RAS GHARIB
Tor
MEDITERRANEAN SEA
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Cairo
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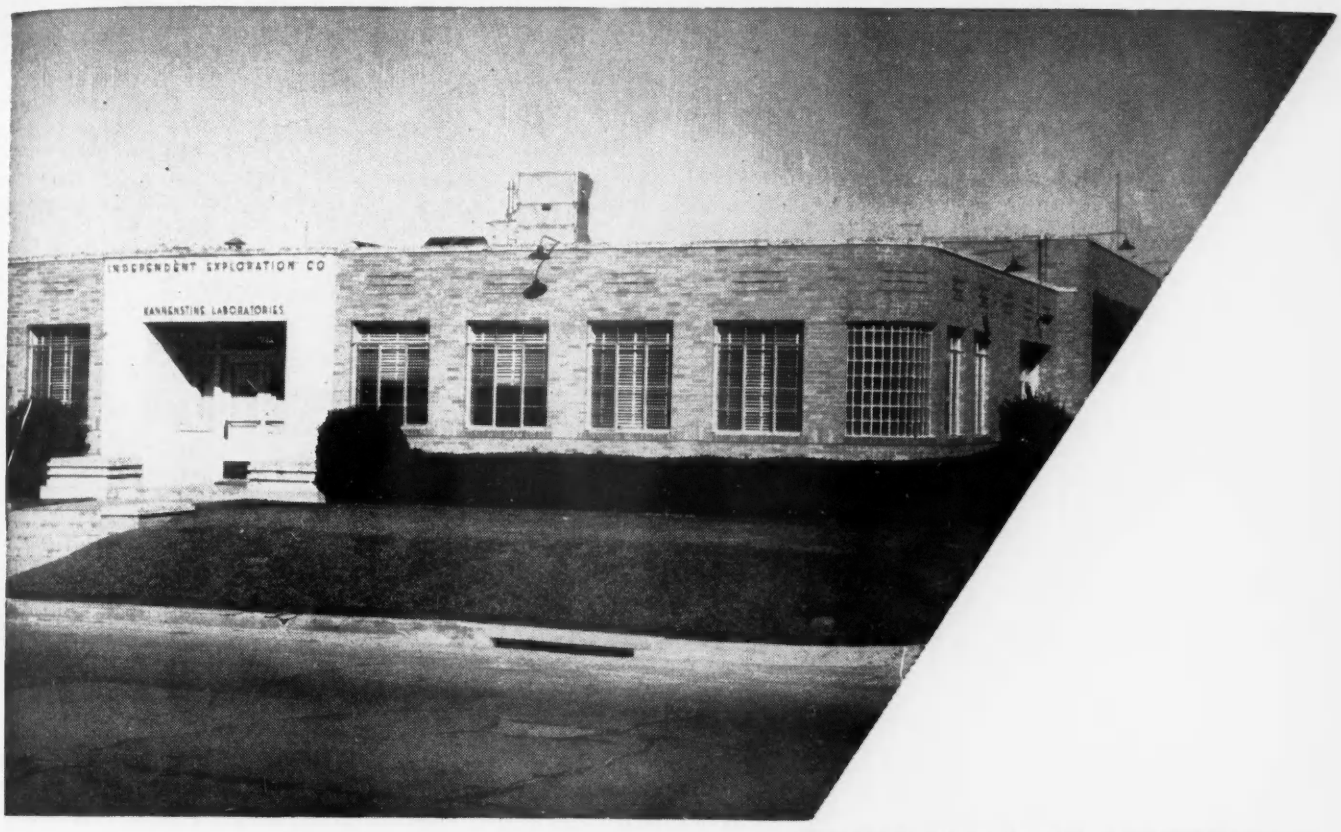
Nekhl
TRANSJORDAN
Siwa
Beni Suef
SINAI PENINSULA
SAUDI ARABIA
LIBYA
Mellawi
Asyût
Nile River
Qena
El Khârga
RED SEA
TROPIC OF CANCER
Aswân
ANGLO-EGYPTIAN SUDAN
STRAIT OF GUBAL
Sherm
RAS GEMSA
(Abd.)
GUBAL ISLAND
TAWILA ISLAND
SHADWAN ISLAND
GIFATIN ISLAND
RAS HURGHADA
RED SEA
WORLD OIL Map



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MOROCCO—Continued

number of wells drilled during 1949 was 56 as compared with 57 drilled in 1948. The company, Societe Cherifienne des Petroles, jointly owned by the French and Moroccan governments, carries on all petroleum activities in the country.

Three of the drilling rigs maintained in the country are capable of drilling below 10,000 feet and one well during the year was put down to 12,500 feet but no deep production was found. Deep drilling is expected to continue south of the Oued Beth field.

Capacity of Morocco's only refinery at Petitjean, near the Bou Draa field, was expanded during the year from 280 to 1000 barrels a day.

Oil Production, Producing Oil Wells and Geological Data on Morocco Fields

REGION and FIELD	Year of Discovery	PRODUCING OIL WELLS END OF 1949			CRUDE OIL PRODUCTION (Barrels)				Proved Area (Acres)	Gravity Oil (API)	PRODUCING FORMATION			DEPTH (Ft.)		Average Thickness of Pay	Type of Structure
		Flowing	Art. Lift	Total	Daily End of 1949	Year 1948	Year 1949	Cumulative Through 1949			Name	Kind	Age	Minimum to Top of Pay	Maximum to Bottom of Pay		
PORT LYAUTEY:																	
Ain Hamra	1918	..	18	18	10	5,500	2,790	59,190	300	45	Tortonian	Sand	Miocene	400	4,500	10	Lenses
Bou Draa	1936	..	1	1	....	1,650	.....	158,150	340	45	Toarcian	Lime	Liassic	600	2,500	15	Anticline
Oued Beth	1947	15	..	15	700	87,350	136,300	229,300	....	35	Primary	Lime and Sandstone	Primary	3,280	3,400	60	Faults
Tselfat	1934	..	1	1	7	1,000	5,080	131,040	130	45	Toarcian-Domerian	Lime	Liassic	300	5,500	40	Anticline
Total	.....	15	20	35	717	95,500	144,170	577,680	....	..	.....	.....	.....	....	....	..	.....

NOTE: All operations by Société Chérifienne des Pétroles.

TUNISIA

IN TUNISIA the Societe d'Etudes et de Recherches Petrolieres en Tunisia (SEREPT) continued exploratory operations in the northern and southern sections of the country. In the north at Cap Bon, 30 miles east of Tunis, a deep test indicated possible gas production but completion was not successful. This area is characterized by complicated folds with intrusions of salt and gypsum beds. The 11,100-foot test drilled here during 1949 was one of a series of deep wells drilled in the area since 1926 in an effort to define the source beds and develop commercial quantities of gas and possible distillate.

SEREPT has two drilling rigs, one of which was kept in South Tunisia during the year preparing to start a deep test near Gabes after preliminary geological and geophysical work was completed.

Gulf Oil Corporation and the Shell Group have signed separate concession contracts with the French government for development rights in Tunisia effective March 11, 1950. Gulf was moving two geological parties and an aerial magnetometer into the country. SEREPT has a 35 percent participation with both Gulf and Shell. The joint company formed with Gulf is known as Societe Nord Africaine des Petroles (SNAP). SNAP's three concession areas consist of a rectangular east-west block centering at Sfaz on the east, the island of Kerkenna, and the island of Djerba. Shell's concession is north of these areas with an eastern boundary along the Tunisian coast.

These concessions cover a new area for North African oil activities and both companies are prepared for deep drilling to thick sedimentary beds long considered favorable by geologists.

OTHER AFRICA

OTHER sections of Africa are currently being explored for possible oil production by various countries interested directly or through their colonies.

In Portuguese East Africa an aerial magnetic survey was completed in mid-1949 under contract with Mozambique Gulf Oil Company, a Gulf subsidiary. The survey covered 47,000 square miles in southeastern Mozambique and the results would not be known until compilation of aerial magnetic maps was concluded. Shallow tests drilled along the coast in the Portuguese colony as far back as 1927 got shows of oil and gas and further exploration in this section can be expected.

In French Equatorial Africa geophysical surveys continued on the coast bordering the Gabon Basin. The French operating company has a heavy rig in the country with which it drilled a second Mabora well to 10,600 feet with no results. A portable rig is also used for geological reconnaissance throughout the area and enough valuable information has been obtained to encourage further deep drilling.

The French are carrying on exploratory work on the west coast of the island of Madagascar off the east African coast. Oil has been found on the island in very small quantities at Tsimiroro and oil shales have been found in the provinces of Majunga, Moevabanana, and Morondava. The coastal sedimentary area is broken up by igneous intrusions into a number of basins favorable to the accumulation of oil, and these areas are now being classified by the French government oil group set up in the colony.

Exploration work continues in Nigeria under licenses granted to D'Arcy Exploration Company (Anglo-Iranian) and Shell Overseas Exploration Company. The work has consisted of geological and geophysical surveying in the upper part of the Niger Delta area with rather discouraging results.

Uganda, a British protectorate in Central Africa, has undergone surface geological study, but no actual drilling was carried on in 1949. On the basis of known geologic structures, several tests are scheduled by the Uguanda Geological Survey near Ruwenzori, the Waki Dome, and the plains of Semliki and Kaiso. A well drilled in the Waki Dome area in 1939 is now thought to have missed the dome's crest, but the results were interesting enough to encourage additional work in the general vicinity.

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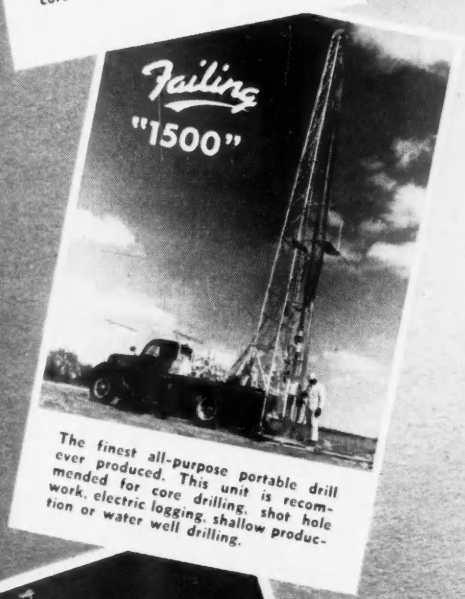

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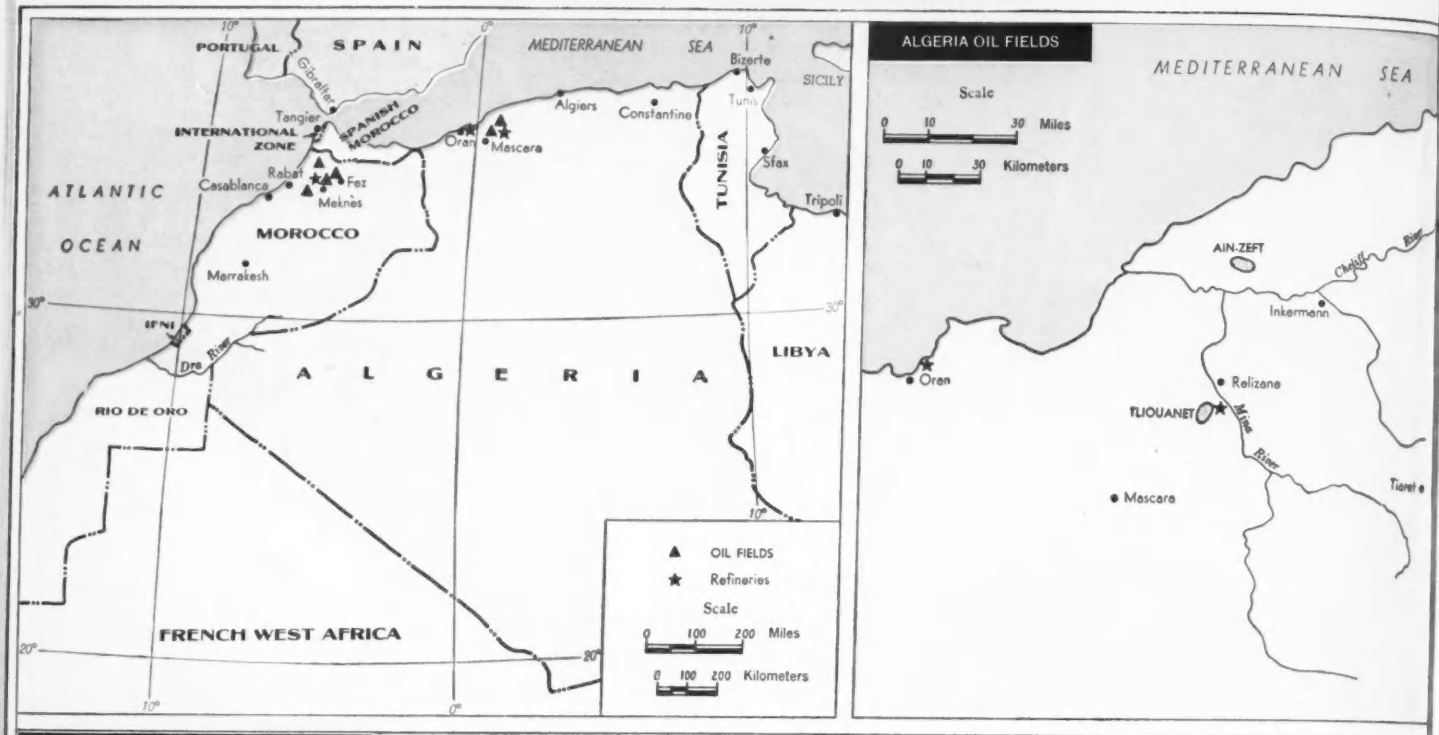
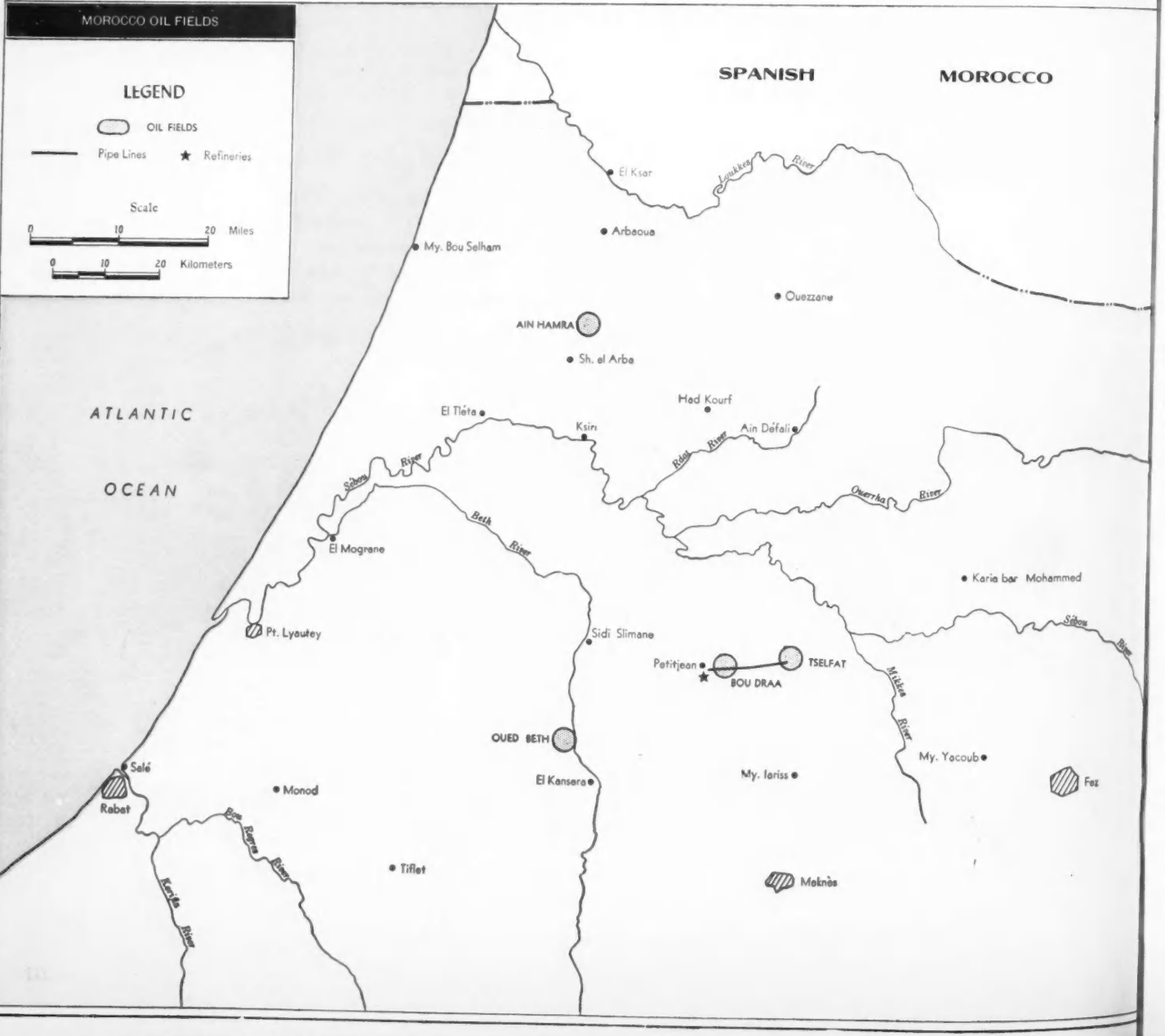
ALGERIA and MOROCCO





MIDDLE EAST—Summary

AVERAGE daily crude production in the Middle East rose from 1,130,000 barrels per day in 1948 to 1,392,000 barrels per day in 1949. Anglo-Iranian Oil Company continued to be the largest producer in the Middle East with a 1949 average of 559,000 barrels per day. Arabian American Oil Company, most important American company in the area, produced an average of 476,000 barrels per day in 1949 against 390,000 barrels per day in 1948. Most spectacular performance, however, was by Kuwait Oil Company, which averaged 128,000 barrels per day in 1948 and nearly doubled its production in 1949 for an average of 246,000 barrels per day.

Exploratory drilling was somewhat more active during 1949 and resulted in four major discoveries, two in Iraq and two in Arabia. A record drilling program was carried out in Kuwait, where 50 wells were drilled in 1949. Twenty-four completions were registered in Saudi Arabia.

Bulk of Persian Gulf Oil went to Western Europe, although after the third quarter of 1948 considerable quantities moved into the U. S. U. S. imports reached a peak of 140,000 barrels per day during the first quarter of 1949 but the 1949 average declined to 102,000 barrels per day.

Outlook for Middle Eastern oil developments continued fairly bright in spite of the fact that European markets did not expand as rapidly as anticipated and though there was opposition to increased imports into the U. S.

Plans for 1950 indicated a slower pace in keeping with the forecast that markets for Middle Eastern oil are not developing as quickly as the producing capacity of the area. American companies in the Middle East are troubled with the necessity of accepting soft currency for a part of their production and must seek every means to use soft currency in payment of operating expenses.

In the pipe line construction field, the Trans-Arabian pipe line was about 50 percent completed at the end of 1949 with final completion scheduled for the end of 1950.

Iraq Petroleum was unable to use its new 16-inch line and old 12-inch line from Kirkuk to Haifa, and the Consolidated refinery at Haifa was also shut down for the year with the exception of a few days when a small amount of crude from Venezuela was run. On the other hand, Iraq Petroleum completed its 16-inch line from Kirkuk to Tripoli in September, 1949, and was thus able to more than double its movement of oil through this port. Production in December, 1949, averaged 112,000 barrels per day, which is more than twice the amount which was moved through the original 12-inch line. Iraq Petroleum is preparing to construct a 30-inch line from Kirkuk to the Mediterranean, with work starting early in 1950.

IRAN

IRAN increased its crude output in 1949 with a yield of 204,712,000 barrels, or an increase of about 7.5 percent over 1948. This is the highest production yet recorded for Iran, which is also still the top producing nation in the Middle East. Average daily production for the country at the close of 1949 was 598,000 barrels, another new high.

The biggest increases in production were recorded in the Agha Jari field in which two oil wells were completed during

Refineries of Iran

COMPANY	Location of Plant	Crude Charging Capacity (Bbls. Daily)	Cracking Capacity (Bbls Daily)	Daily Crude Runs End of 1949	Type of Refinery
Anglo-Iranian Oil Co., Ltd.	Abadan	500,000	125,000	480,000	Complete except for Lubes and Waxes
Kermanshah Pet. Co. (Anglo-Iranian)	Kermanshah	2,300	None	2,400	Skimming
Total	.....	502,300	125,000	482,400	.....

Drilling in Iran

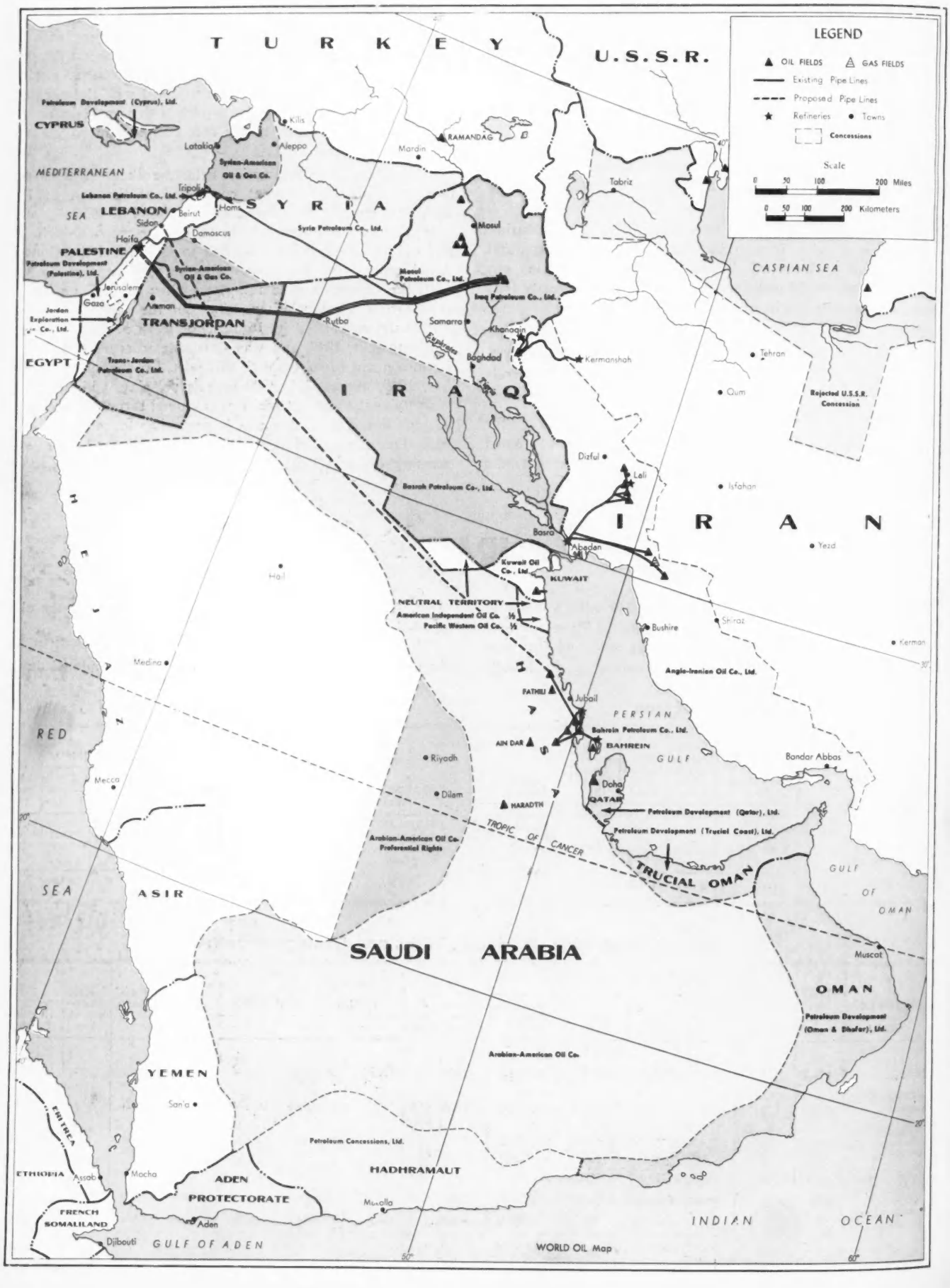
PROVINCE and FIELD	WELLS COMPLETED IN 1948			WELLS COMPLETED IN 1949				Wells Drilling End of 1949
	Oil	TOTAL Wells	TOTAL Footage	Oil	Dry	TOTAL Wells	TOTAL Footage	
KHUZISTAN:								
Agha Jari	3	3	19,683	2	1	3	17,941	2
Lali	2	2	9,470	1	..	1	12,668	2
Naft Safid	1	1	6,455	2	..	2	28,574	4
Total	6	6	35,608	5	1	6	59,183	8

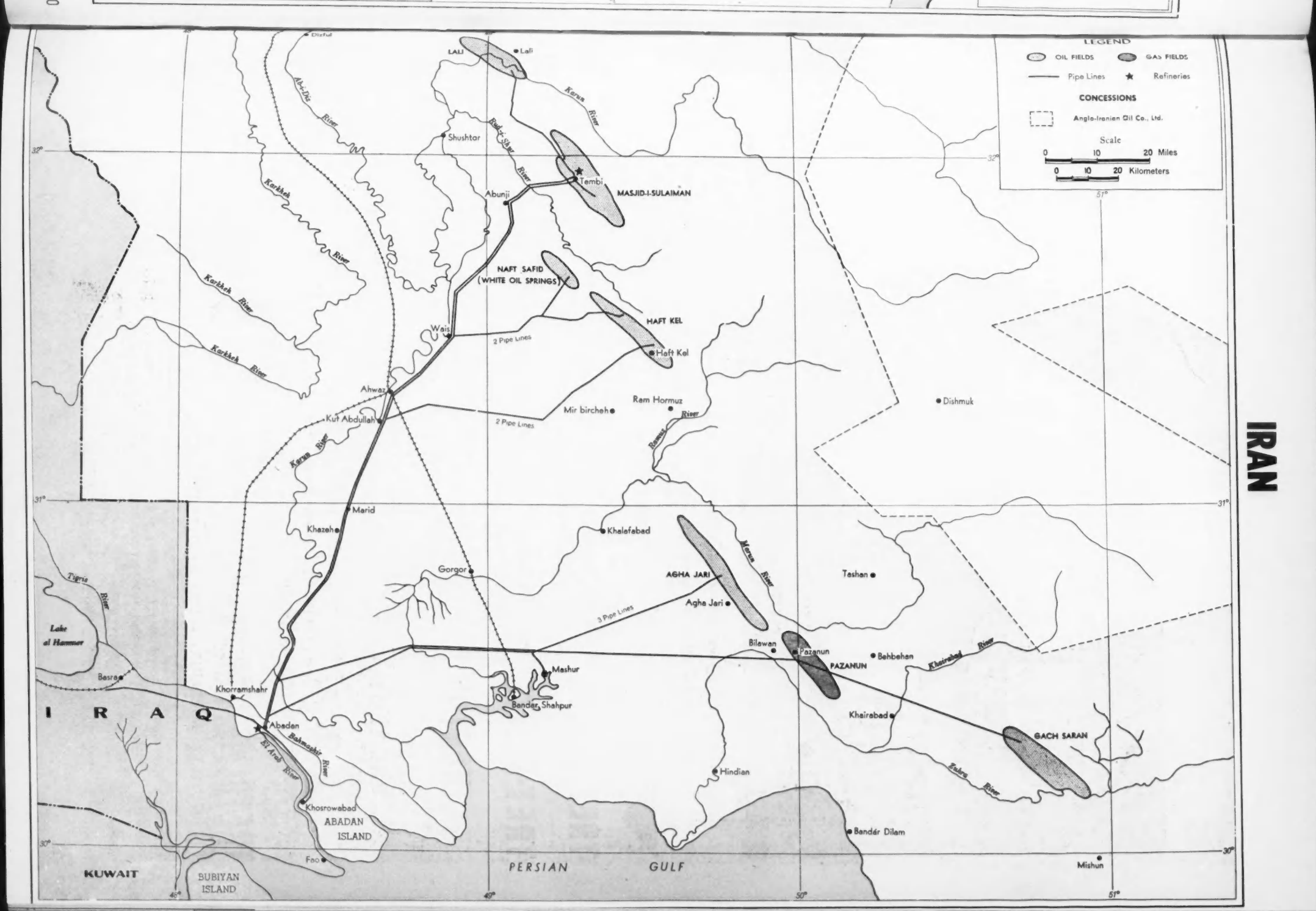
Iran Oil Production, Producing Wells and Geological Data

PROVINCE and FIELD	Year of Discovery	Producing Oil Wells End of 1949 Flowing	CRUDE OIL PRODUCTION Daily End of 1949	Year 1948	Year 1949	Cumulative Through 1949	Est. Proven Area (Acres)	Gravity of Oil (API)	PRODUCING FORMATION Name	Kind	Age	Minimum to Top of Pay	Maximum to Bottom of Pay	Average Thickness of Pay	Type of Structure
FARS:															
Gach Saran	1928-37	3	37,000	14,779,800	14,607,000	105,229,000	38,400	32.8	Asmari	Limestone	Olig.-Mio.	4,000	7,000	1,500	Anticline
KERMANSHA:															
Naft-i-Shah	1923	1	4,000	1,131,700	1,159,000	11,953,000	3,840	42.8	Kalkur	Limestone	Olig.-Mio.	2,600	2,700	250	Anticline
KHUZISTAN:															
Agha Jari	1937-38	15	287,000	68,752,500	84,315,000	247,469,000	23,000	35.6	Asmari	Limestone	Olig.-Mio.	6,000	9,000	600	Anticline
Haft Kel	1928	20	197,000	75,737,400	72,673,000	897,995,000	28,800	39.2	Asmari	Limestone	Olig.-Mio.	3,000	4,000	900	Anticline
Lali	1938	2	7,500	2,961,700	3,020,000	6,000,000	4,000	35.3	Asmari	Limestone	Olig.-Mio.	5,000	7,000	1,200	Anticline
Masjid-i-Sulaiman	1908	29	43,000	25,773,600	21,105,000	840,140,000	34,500	38.0	Asmari	Limestone	Olig.-Mio.	2,000	3,000	1,000	Anticline
Naft Safid (White Oil Springs)	1934-38	3	22,500	1,246,800	7,833,000	21,826,000	13,000	35.8	Asmari	Limestone	Olig.-Mio.	5,600	5,700	900	Anticline
Pazanun (Condensate)	1937	....	.....	.....	.....	6,500,000	6,400	....	Asmari	Limestone	Olig.-Mio.	6,000	8,000	700	Anticline
Total	....	73	598,000	190,383,500	204,712,000	2,137,112,000	161,940	....	.....	.....	.....	....	....	....	.....

NOTE: Anglo-Iranian Oil Co. operating in all fields except Naft-i-Shah which is operated by Kermanshah Pet. Company.

MIDDLE EAST—Concessions




LEGEND
OIL FIELDS
GAS FIELDS
Pipe Lines
Refineries
CONCESSIONS
Anglo-Iranian Oil Co., Ltd.
Scale
0 10 20 Miles
0 10 20 Kilometers
IRAN
IRAQ
KUWAIT
PERSIAN GULF
LALI
Lali
Shushtar
Tembi
MASJID-I-SULAIMAN
Abunji
NAFT SAFID
(WHITE OIL SPRINGS)
HAFT KEL
Haft Kel
Wais
2 Pipe Lines
Ahwaz
Kut Abdullah
Mir bircheh
Ram Hormuz
Dishmuk
Marid
Khazeh
Khalafabad
Gorgor
AGHA JARI
Agha Jari
3 Pipe Lines
Tashan
Bilawan
Pazanun
Behbehan
PAZANUN
Mashur
Bandar Shahpur
Khorramshahr
Abadan
Khairabad
GACH SARAN
Hindian
Khosrowabad
ABADAN ISLAND
Bandar Dilam
Mishun
Fao
BUBIYAN ISLAND
Basra
Lake al Hammar
Tigris River
Karun River
Karkheh River
Ab-i-Diz River
Rud-i-Shur River
Bawanat River
Khairabad River
Bahmashir River
Shatt Arab River
Fahra River

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Hays, Phone 217
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Wichita, Phone 4-8314
Pratt, Phone 1196

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Henderson, Phone 4354

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Jena, Phone 376
Lafayette, Phone 1170
Lake Charles, Phone 2461
Monroe, Phone 944
New Orleans, Phone Chestnut 9109
Ruston, Phone 532

MICHIGAN
Mt. Pleasant, Phone 31-141

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Hattiesburg, Phone 3508
Jackson, Phone 2-6337

MONTANA
Billings, Phone 9-4422

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Hobbs, Phone 449

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Duncan, Phone 487 or 1192
Oklahoma City, Phone 5-1088 or 9-5424
Shawnee, Phone 3693
Tulsa, Phone 2-3277
Wewoka, Phone 488
Wilson, Phone 63

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Amarillo, Phone 8935
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IRAN—Continued

the year, bringing that field's total to 15 producing wells; and the Naft Safid field in which two oil wells completed during the year brought the total up to three producers—one well having been shut in during the year.

No wildcat drilling is now being carried on and there is only a small amount of development drilling. The 1949 production is more remarkable when it is considered that there are only 73 wells now producing in the country, or four less than the previous year. Eight field wells were drilling in Iran at the end of 1949 and possibilities exist for further exploratory drilling in the country upon completion of a current photographic aerial survey in Southern Iran.

Iran was running 482,400 barrels of crude per day to its two refineries at the end of 1949. Total capacity is 502,300 barrels.

Crude Oil Pipe Lines of Iran

COMPANY	Origin	Terminus	Length (Miles)	Diameter (Inches)	Capacity (Bbls. Daily)	Year Completed
Anglo-Iranian Oil Co., Ltd.	Majid-i-Sulaiman	Abadan	133	10 & 12	80,000	1916–17
	Haft Kel	Abadan	136	12		
	Haft Kel	Marid	124	12	220,000	1929–38
	Haft Kel	Kut Abdullah	61	12		
	Naft Safid	Wais	32	10 &		
	Agha Jari	Abadan	97	12	225,000	1945–48
	Agha Jari	Mashur	42	12		
	Agha Jari	Mashur	45	20 & 22	170,000	1949
	Gach Saran	Abadan	166	12	40,000	1940
	Naft-i-Shah Lali	Kermanshah	146	3	3,200	1935
		Masjid-i-Sulaiman	40	8, 10 & 12	26,000	1948
Total	.....	.....	1,022	.....	764,200	.....

IRAQ

IRAQ'S production surpassed the 1948 figure by more than 5 million barrels for a total of 31,729,146 barrels in 1949. This output, however, was almost 2 million less than the 1947 production, due principally to shutting down operations on the southern sector of the Haifa-Kirkuk pipe line at the first of the year.

All production, with the exception of 2,864,520 barrels from the Naft Khaneh field, came from Kirkuk, which at the end of 1949 was producing 112,000 barrels daily from ten wells. There are 17 oil wells in the Kirkuk field now shut in because of lack of pipe line facilities and 15 observation wells in the general area, some of which are oil productive. The Kirkuk field is operated by Iraq Petroleum Company, Ltd. and the greatest problem is to develop an outlet for the oil so that the field can be put on a full production status. The Naft Khaneh field is operated by Anglo-Iranian Oil Company, while Mosul Petroleum Company, Ltd., controls the Ain Zalah and Qaiyarah fields, which are presently shut in because of lack of outlet.

Two wildcats were completed in the Basrah area of Southern Iraq in 1949. Each developed oil from the Cretaceous zone and three additional wells were drilling at the end of the year to evaluate the extent of the discoveries. Basrah Petroleum Company, Ltd., a member of the Iraq Petroleum group, completed its first well at Nar Umar, and the initial potential test indicated 2500 barrels daily. Twenty-four miles south of this well the second test at Zubair had an initial potential of 3500 barrels daily from 7775 feet. Near the Turkish border another wildcat was drilling at Mushorah Dagh, an area developed by surface geological study. Two rigs were also operating in the Ain Zalah field.

The future of American oil markets in the Mediterranean area hinges on construction of the big-inch pipe line from Kirkuk to Banyas, Syria, on the Mediterranean coast. Due to strong anti-

Crude Oil Pipe Lines of Iraq

COMPANY	Origin	Terminus	Length (Miles)	Diam. (Inches)	Capacity (Bbls. Daily)	Year Completed
Iraq Pet. Co., Ltd.	Kirkuk	Haifa	620	12¾	90,000	1934
	Kirkuk	Tripoli	530	12¾	B.P.D.	1934
	Kirkuk	Haifa	620	16	180,000	Building
	Kirkuk	Triploi	530	16	B.P.D.	In Partial Operation
	Kirkuk	Banias	556	28–32	275,000	Planned
	Naft Khaneh	Alwand	24	4–6	8,600	1927
	Zubair	Fao	72	12¾	50,000	Planned

Oil Production and Producing Wells in Iraq

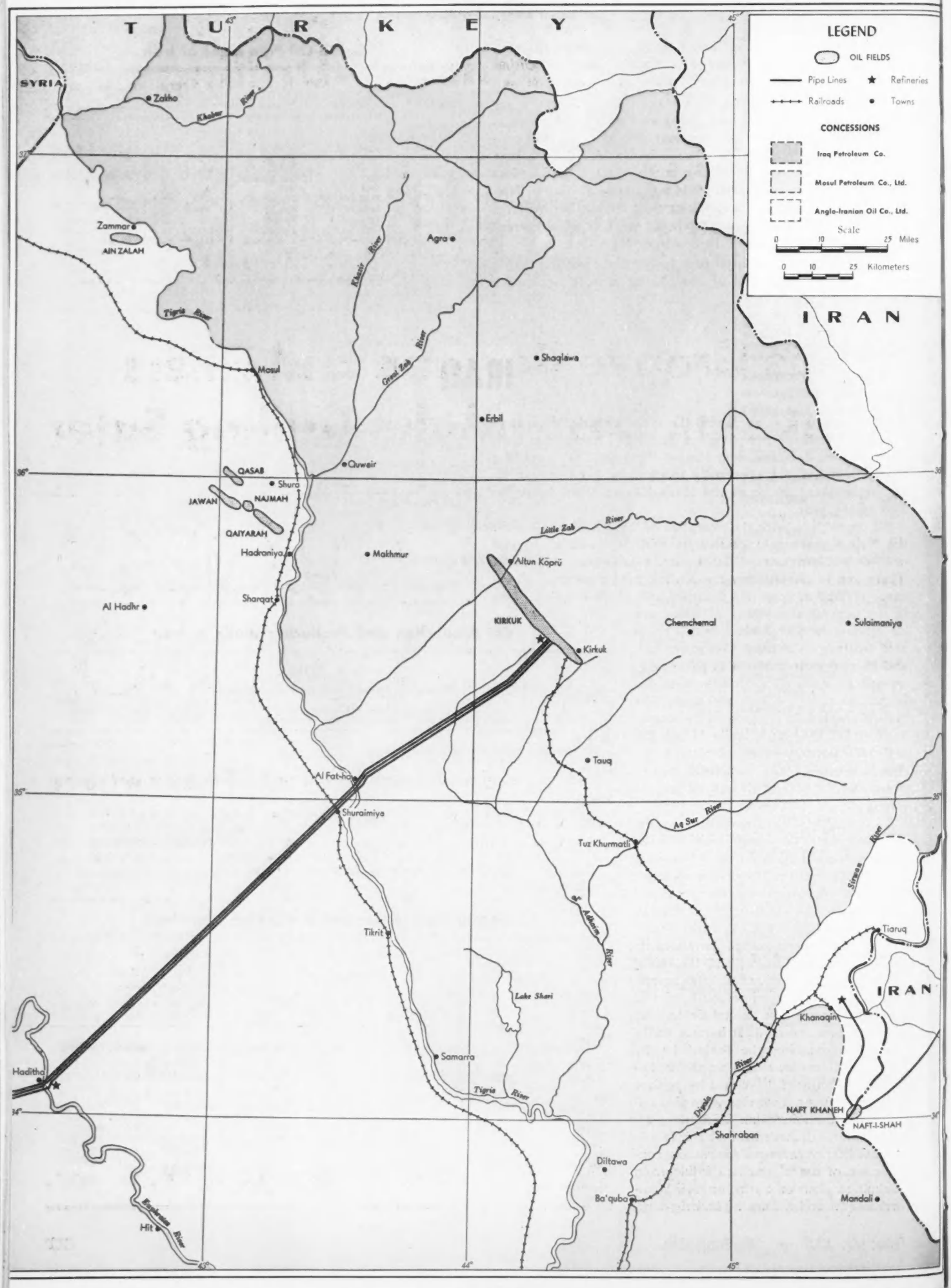
PROVINCE and FIELD	Operating Company	Year of Discovery	WELLS PRODUCING END OF 1949		Daily at End of 1949	Year 1948	Year 1949	Cumulative Through 1949
			Flowing	Total Producing				
DIYALA:								
Naft Khaneh	Khanaquin Oil Co., Ltd. (Anglo-Iranian)	....	..	..	.....	2,885,000	2,864,520	27,229,938
KIRKUK:								
Kirkuk	Iraq Pet. Co., Ltd	1927	10	42*	112,000	23,581,246	28,864,626	421,092,615
MOSUL:								
Ain Zalah	Mosul Pet., Ltd	1940	..	6†	.....	.....	.....	.....
Qaiyarah		1927	..	1‡	.....	.....	.....	.....
Total	.....	....	10	49	112,000	26,466,246	31,729,146	448,322,553

* Including 17 producing wells shut in and 15 observation wells. † Shut in field not yet on production basis.
‡ Producing intermittently.

Engineering and Geological Data on Iraq Fields

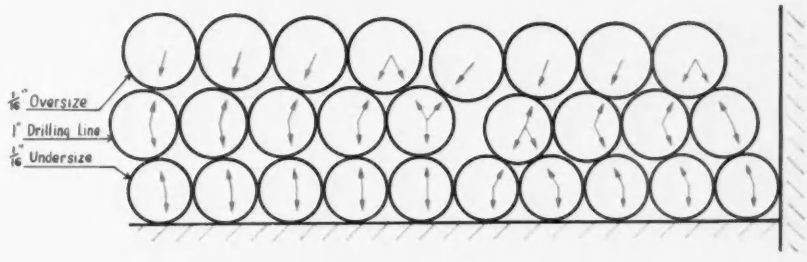
PROVINCE and FIELD	Proved Area (Acres)	Gravity Oil API	Name	Kind	Age	Depth (Ft.) Minimum to Top of Pay	Depth (Ft.) Maximum to Bottom of Pay	Average Thickness of Pay (Feet)	Type of Structure
DIYALA:									
Naft Khaneh	.....	42.8	Asmari	Limestone	Mio.-Eoc.	3000	....	200–300	Anticline
KIRKUK:									
Kirkuk	83,500	36	Quarah Chauq	Limetone	Eoc.-Mio.	950	3200	800	Closed Anticline
MOSUL:									
Ain Zalah	3,600	32	Ain Zalah	Limestone	Cret. or Mio.	5000	6000	200	Closed Anticline
Jawan	8,500	20	Main Limestone	Limestone	Miocene	700	1000	600	Anticline
Najmah	2,000	20	Main Limestone	Limestone	Miocene	700	1000	600	Anticline
			Pilsner	Limestone	Upper Cret.	1500	1800	300	Anticline
Qaiyarah	12,000	20	Shallow Zone	Limestone	Miocene	.....	.....	.....	Anticline
			Main Limestone	Limestone	Miocene	700	1000	600	
Qasab	3,900	20	Main Limestone	Limestone	Miocene	700	1000	600	Anticline
			Pilsner	Limestone	Upper Cret.	1500	1800	300	

IRAQ


T U R K E Y
SYRIA
IRAN
Zaitho
Khabur River
Zammar
AIN ZALAH
Tigris River
Agra
Khasir River
Great Zab River
Shaqlawa
Mosul
Erbil
Quweir
QASAB
Shura
JAWAN
NAJMAH
QAIYARAH
Hadraniya
Makhmur
Little Zab River
Altun Köprü
Sharqat
Al Hadhr
KIRKUK
Kirkuk
Chemchemal
Sulaimaniya
Tauq
Al Fat-ha
Shuraimiya
Aq Sur River
Tuz Khurmatli
Sirwan River
Tikrit
Al Adhaim River
Tiaruq
Lake Shari
Khanaqin
Samarra
Haditha
Tigris River
Diyala River
NAFT KHANEH
NAFT-I-SHAH
Shahraban
Diltawa
Ba'quba
Mandali
Euphrates River
Hit
LEGEND
OIL FIELDS
Pipe Lines
Refineries
Railroads
Towns
CONCESSIONS
Iraq Petroleum Co.
Mosul Petroleum Co., Ltd.
Anglo-Iranian Oil Co., Ltd.
Scale
0 10 25 Miles
0 10 25 Kilometers

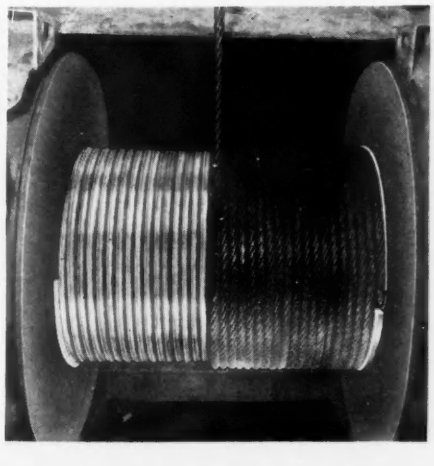
Flat Drum Spooling Crushes, Squeezes—Wastes—Drilling Line

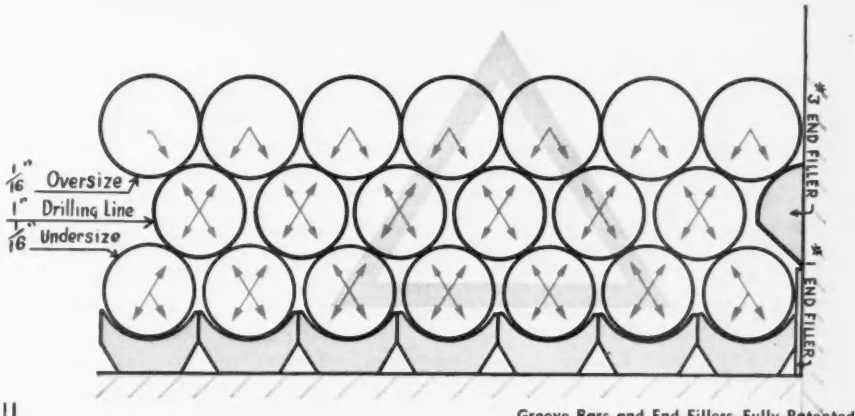
Notice how disorderly tapered wire line spools on a flat drum. The result is squeezing and cutting-in as indicated by the red arrows. These wasteful and hazardous conditions can be corrected by grooving the drum with LeBus Groove Bar and End Fillers.



LeBus Groove Bar and End Fillers Cut Line Cost—Make Drilling Safer

Even a tapered and distorted line spools evenly and safely on a grooved drum. Notice how the loads, shown by the arrows, line up. Notice also how the wraps "pyramid." This controlled contact and even loads mean longer life and safer drilling operation. Shown in the photograph is a drawworks drum equipped with LeBus Groove Bar and End Fillers with the first wrap of wire line half on. For complete details on Groove Bar installation and operation, including blue prints, write today. Prices and other details will be furnished if you include make and model of your rig and line size.





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IRAQ—Continued

American feeling in Syria there is a possibility that the Iraq pipe line will get a preferential right-of-way across Syria over the Trans-Arabian pipe line now under construction. The Trans-Arabian pipe line is being constructed largely by American interests while the Iraq line is controlled almost entirely by British interests. The right-of-way across Syria is essential to both pipe lines and at the present time the British interests hold the upper hand. Completion of the Iraq pipe line will flood the European and Mediterranean soft currency markets and fairly well block off American markets in that area.

Refineries of Iraq

COMPANY	Location of Plant	Crude Charging Capacity (Bbls. Daily)	Type of Refinery	Operating Status
Iraq Government	Baiji	....	.....	Planned
Iraq Pet. Co., Ltd.	Kirkuk	1,500	Skimming	Operating
	Kirkuk	2,280	Skimming	Building
	K-3 Station	1,500	Skimming	Operating
	K-3 Station	6,450	Skimming	Building
Anglo-Iranian Oil Co., Ltd.	Alwand	7,500	Skimming	Operating

*NOTE: Refineries at Kirkuk and K-3 Station supply only petroleum products for Iraq Petroleum Co.'s own operations.

Drilling in Iraq

PROVINCE and FIELD	WELLS COMPLETED IN 1948					WELLS COMPLETED IN 1949			Wells Drilling End of 1949
				Total			Total		
	Oil	Gas	Dry	Wells	Footage	Oil	Wells	Footage	
DIYALA:									
Naft Khaneh	1	..	..	1	2,064	..	..	.....	..
KIRKUK:									
Kirkuk	..	1	..	4*	17,403	9	9†	29,939	3
Wildcats	..	1	..	1	2,667	..	..	.....	..
MOSUL:									
Ain Zalah	2	..	2	4	17,098	..	..	.....	..
Total	3	2	2	10	39,232	9	9	29,939	3

* Includes 3 observation wells. † Includes 4 observation wells.

KUWAIT

KUWAIT almost doubled its production during 1949 over the previous year to reach an annual total of 89,930,444 barrels. Growth of the Burghan field, the only oil producer in the Sheikdom, has been so phenomenal that the ultimate extent of the field is still pure conjecture. The field which produced 62,000 barrels of oil daily from 13 wells at the beginning of 1948 was producing 271,258 barrels daily from 61 wells at the end of 1949. Forty-nine successful oil wells were completed in 1949 for a total of 232,468 feet, and estimated proved acreage was increased from 22,000 acres in 1948 to 32,000 last year.

A deep test was drilling in the center of the Burghan field at about 6000 feet at the close of 1949. The test is seeking deep limestone production in the area, and the heavy rig being used is capable of reaching 12,000 feet. Present Burghan production comes from a series of sandstones, and as the other big Middle East fields are mostly limestone reservoirs, it was thought the same zones might be found at greater depth in Kuwait. In the Burghan field proper ten drilling rigs were in operation at the end of 1949. Thought to be the greatest concentration of oil in a single field, the reserves are estimated to be in excess of 10 billion barrels. Cumulative production from the field in 3½ years of actual operation was 158,633,124 barrels at the end of last year.

Kuwait began refining some of the Burghan production during 1949 with the completion of the 25,000-barrel-a-day refinery at Mena al Ahmadi near the previous submarine loading line. An oil loading jetty was put into operation at the same time which can accommodate six tankers. With the completion of an extensive field gathering system, movement of oil to the refinery and loading jetty has been simplified.

The entire sheikdom of Kuwait is under lease to Kuwait Oil Company, Ltd. The grant covering about 6000 square miles was made in 1934 and only the Burghan field has been developed commercially. The field was discovered in 1938 but because of the war full exploitation did not start until almost nine years later.

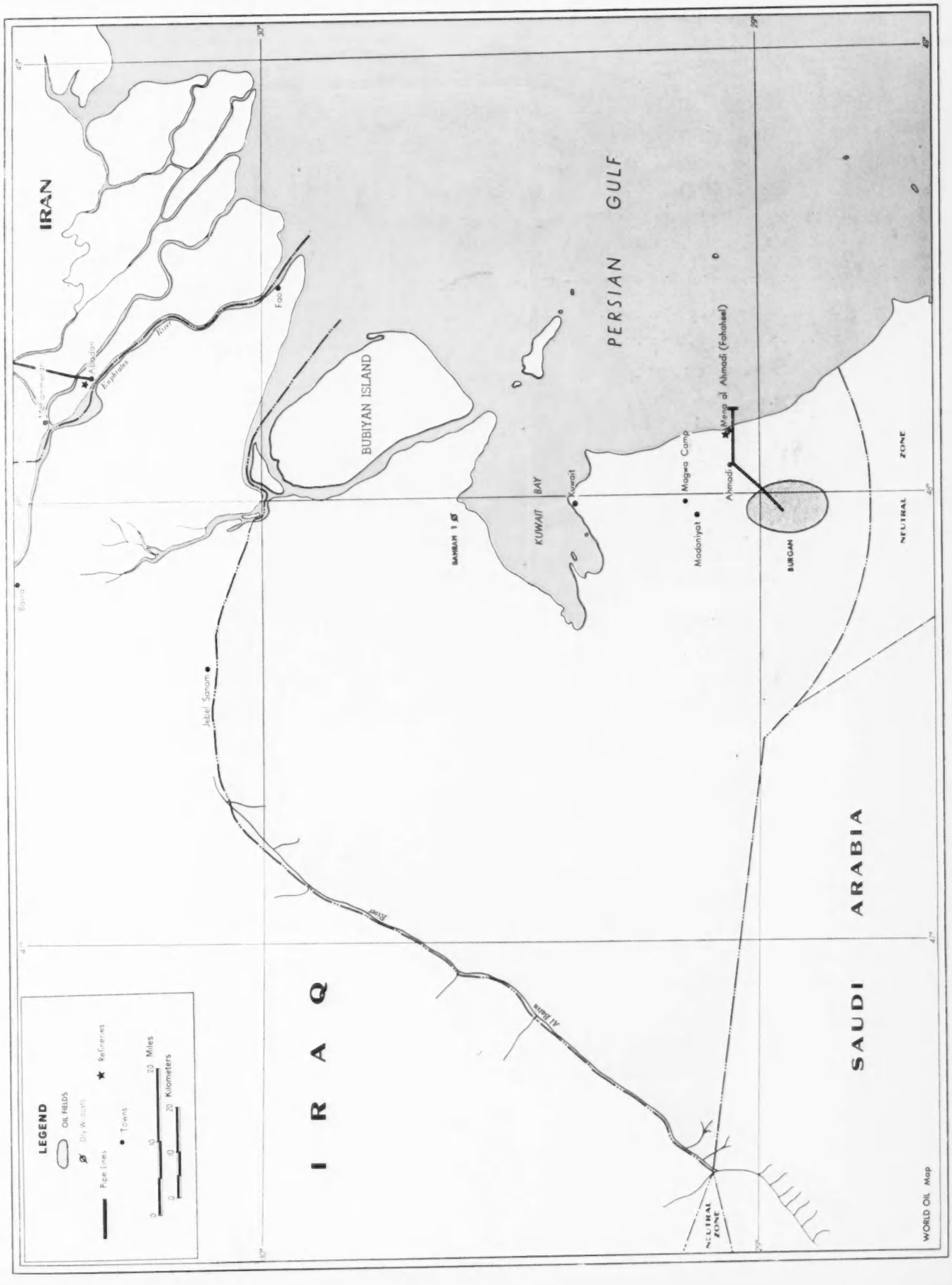
Salient Data on Burgan Field

Operating Company	Kuwait Oil Co., Ltd. (Gulf Oil Corporation and Anglo-Iranian)
Year of Discovery	1938
Producing Wells End of 1949 Oil	61
Wells Completed in 1949 Oil	49
Field Wells Drilling End of 1949	10
Footage Drilled During 1949	246,773 feet
Production in 1948	46,546,795 barrels
Production in 1949	89,930,444 barrels
Cumulative Production to End of 1949	158,633,124 barrels
Daily Production at End of 1949	271,258 barrels
Estimated Proved Area of Field	32,000 acres
Gravity of Oil (A.P.I.)	32.5
Producing Formation—Local Name	.....
Kind	Sand
Age	Middle Cretaceous
Minimum Depth to Top of Pay	3600 feet
Maximum Depth to Bottom of Pay	4800 feet
Average Thickness of Pay	.... feet
Type of Structure	Anticline
Concession Area	3,839,996 acres (All of Kuwait)

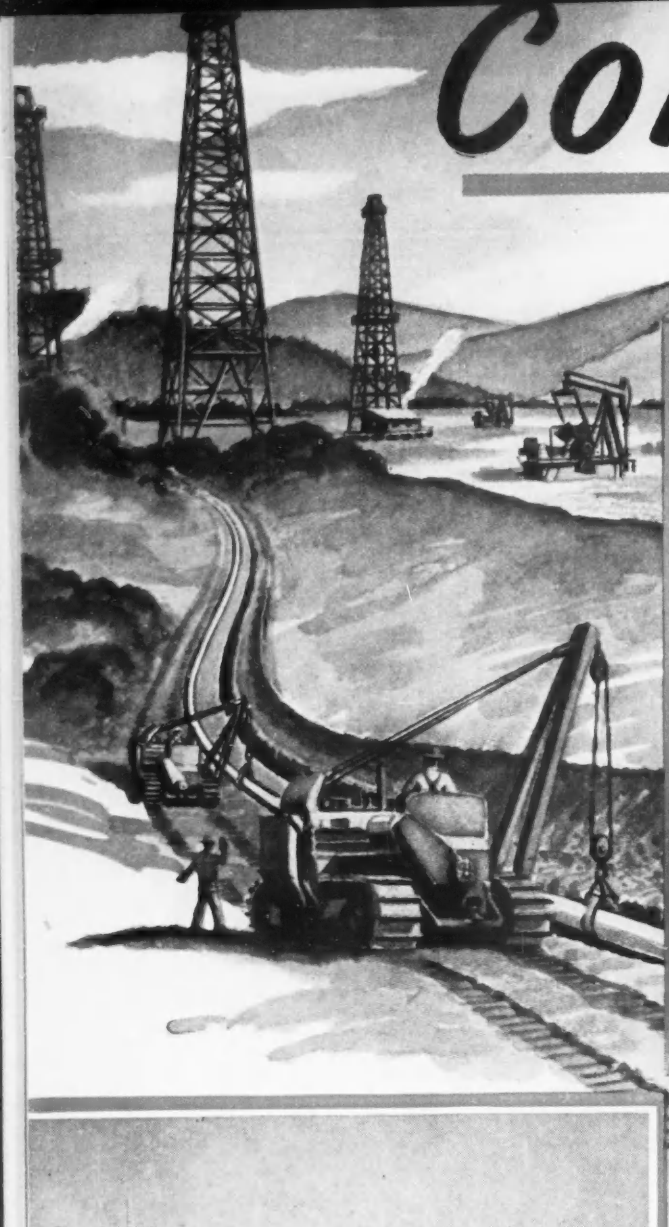
NEUTRAL ZONE

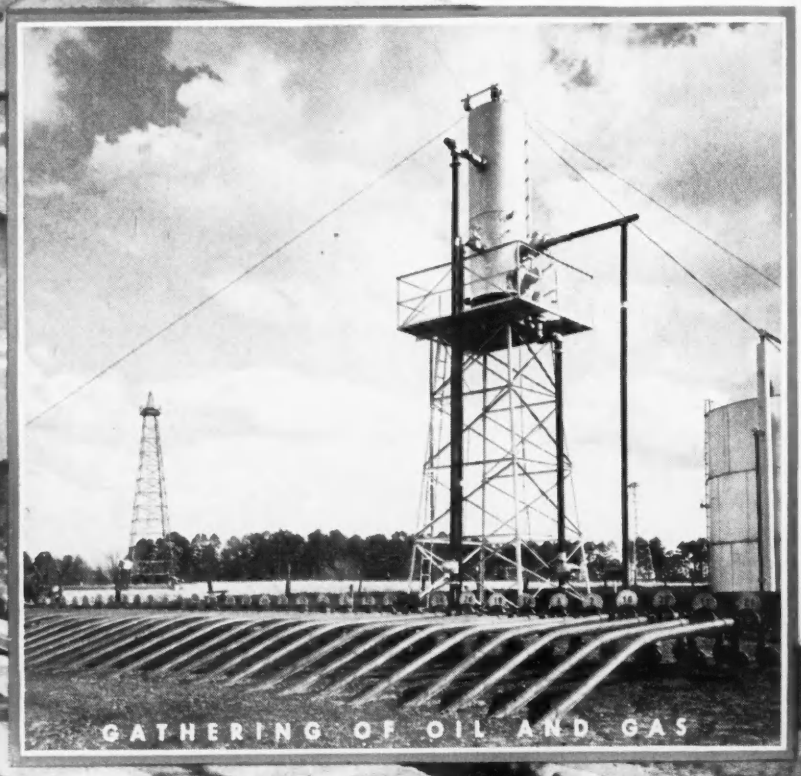
THE Neutral Zone between Kuwait and Saudi Arabia had its first exploratory well in 1949. American Independent Oil Company holds Kuwait's half interest in the 50-by-45-mile area and Pacific Western Oil Corporation holds Saudi Arabia's half interest. The companies operated jointly on the first well, which was abandoned at 5020 feet as dry. The well was considered more of a structural test than an actual production quest, and was carried deep enough to obtain electric log correlations with the Burghan field in Kuwait. A structure was developed running north and south to the west of the well which appeared to be on the flank of the possible trap. Another structural test was begun west of the first well to check the possibility of a fault bisecting the indicated structure, and was drilled below 3500 feet.

KUWAIT

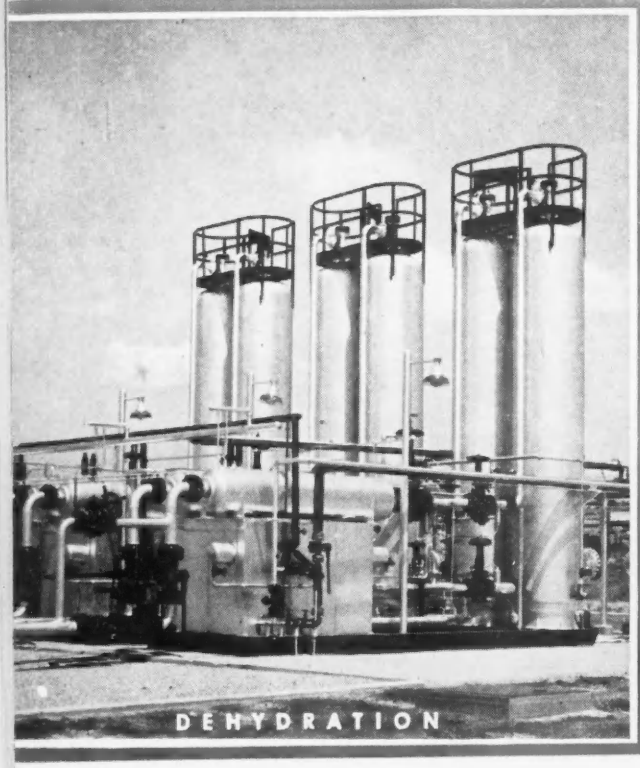

IRAN
PERSIAN GULF
BUBIYAN ISLAND
KUWAIT BAY
Kuwait
Mina al Ahmadi (Fahaheel)
Ahmadi
Magwa Camp
Madaniyat
BURGAN
NEUTRAL ZONE
BAHRAIN
Jebel Sanam
IRAQ
SAUDI ARABIA
NEUTRAL ZONE
Abadan
Euphrates River
Fao
Basra
LEGEND
OIL FIELDS
Dry Wells
Refineries
Pipe Lines
Towns
Miles
Kilometers
WORLD OIL Map

Continental

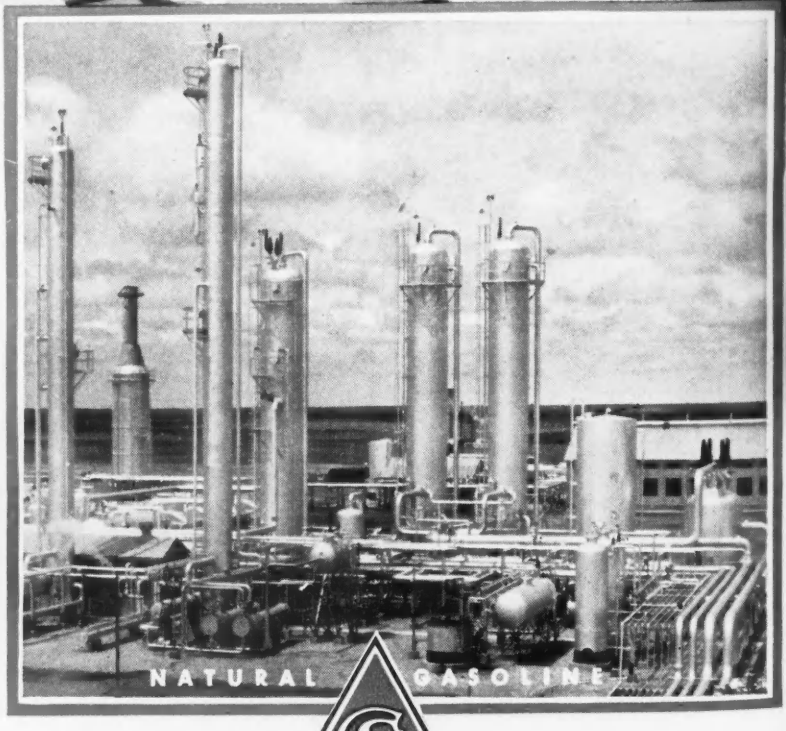




GATHERING OF OIL AND GAS



DEHYDRATION



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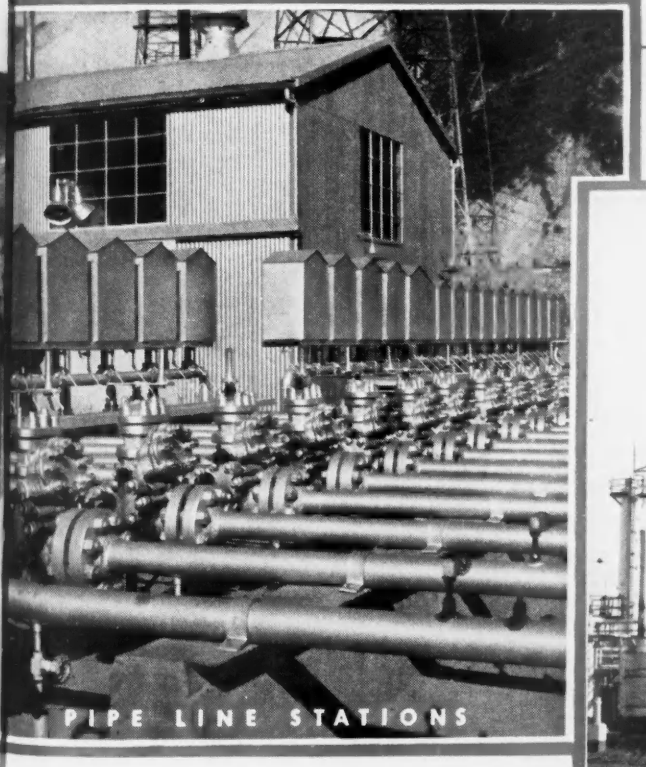
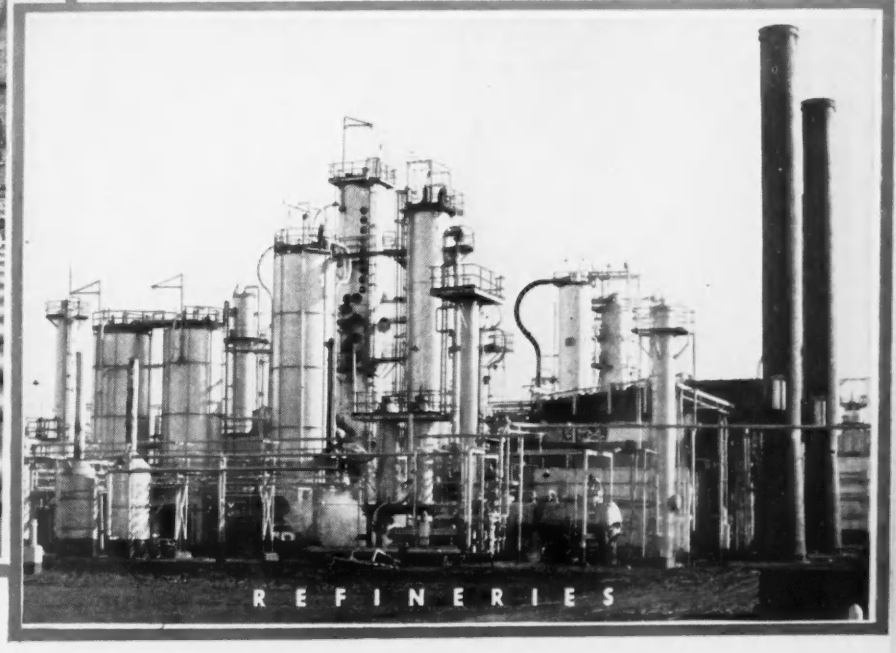


PIPE LINE STATIONS



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CONTINENTAL

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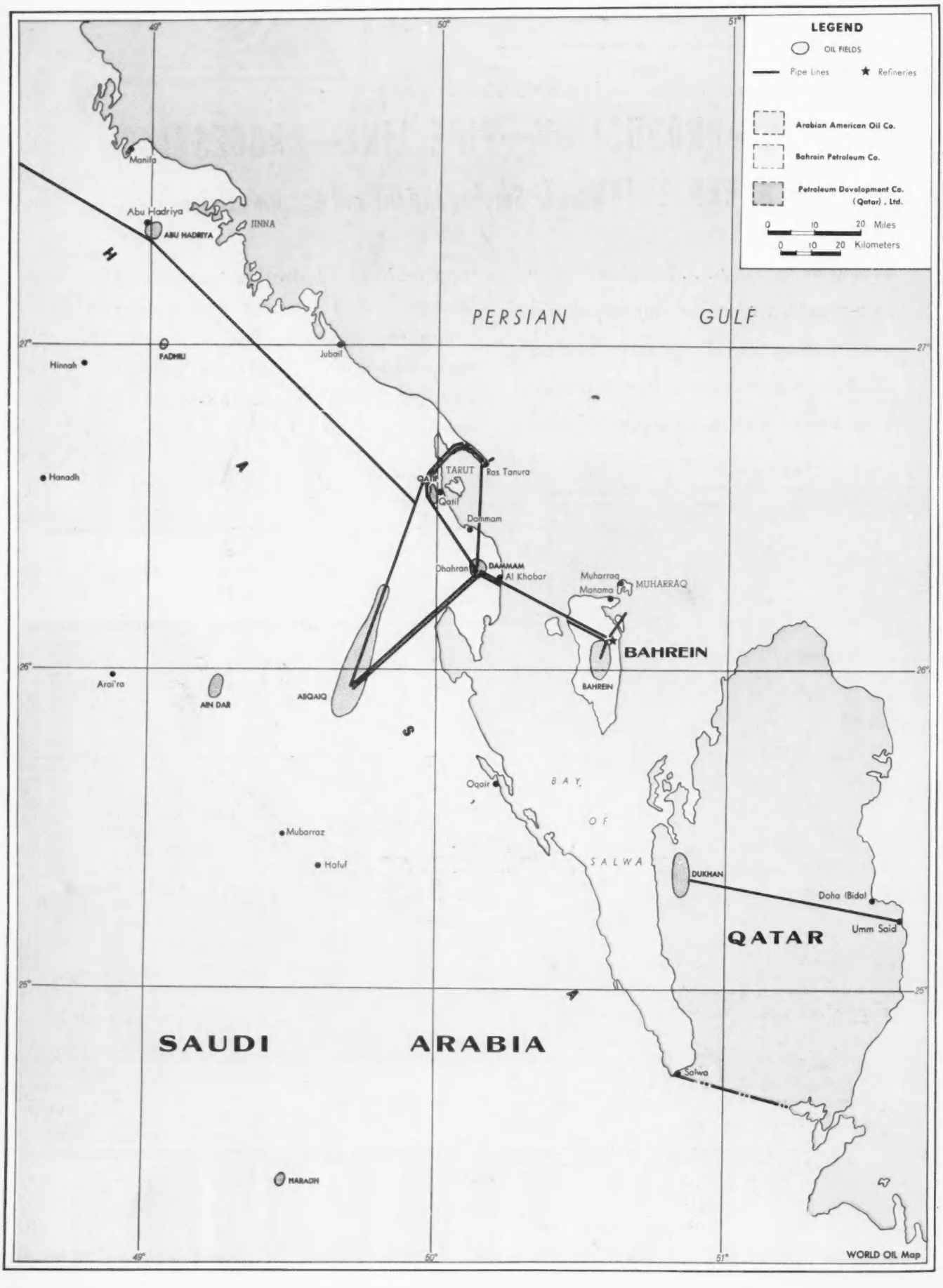
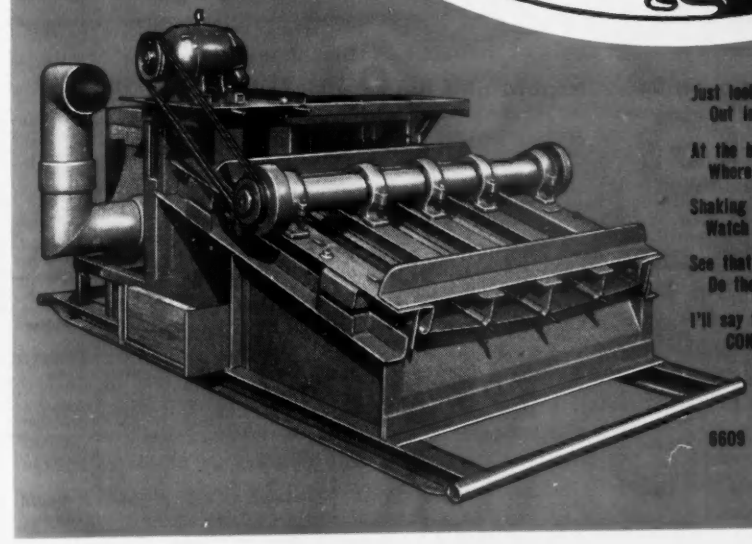
SAUDI ARABIA - BAHREIN - QATAR



"RUMBA" Model

SHALE SHAKER



"Flo" Takes Over

Just look me over, Folks,
Out in sunny Honolulu

At the beach at Waikiki,
Where the maidens dance the Hula

Shaking all from neck to knee.
Watch each quiver, shake and movement,

See that rhythmic slide and roll;
Do they shake themselves to pieces?

I'll say they don't—THEY'VE GOT CONTROL!!

Now go out and watch your mud screen
With its rattle clank and cry.

Watch it shake itself to pieces—
Watch the bolts and rivets fly.

Listen folks we've got the answer,
We have really reached the goal.

It's the Fleilght "RUMBA" Shaker—
What's it got—IT'S GOT CONTROL!

HUTCHISON MANUFACTURING COMPANY

6609 AVENUE U — HOUSTON 11, TEXAS

QATAR

QATAR became an oil producer in 1949 when the first tanker load of crude left Umm Said. Petroleum Development Company (Qatar), Ltd., now has nine productive wells in Dukhan field on the Qatar peninsula. The first was completed in the field in 1940 and drilling has continued sporadically but no outlet was available until last year. Completion of storage facilities and a pipe line to Umm Said has made full production of the completed wells possible and daily production from the field is expected to be about 40,000 barrels this year.

Offshore exploration has not been overlooked in the shiekdom of Qatar as evidenced by a concession grant to a company jointly formed by The Superior Oil Company and Central Mining and Investment Corporation, a London oil and mining finance company. The concession covers a 12-mile belt offshore around the Qatar peninsula covering about 6 million acres of sea bed. This is Superior's first large-scale venture outside the U. S. and some arbitration over the concession may develop with Petroleum Development Company (Qatar), Ltd., which holds a 75-year lease on the entire peninsula.

SAUDI ARABIA-BAHREIN

SAUDI ARABIA further established itself as a major oil producing country during 1949 with production increasing about 31 million barrels over 1948. Eleven wells drilled at Abqaiq extended the field's proven area 4800 acres and increased yearly production by about 32 million barrels. A slight drop in production was noted for the Dammam field in 1949. Only one well was drilled during the year and it was a gas well. Three successful oil wells in the Qatif field increased that field's proven acreage and production.

Successful exploratory drilling by Arabian American Oil Company found two new potentially productive areas at Fadhili, 70 miles northwest of Dhahran, and at Haradh, 160 miles southwest of Dhahran.

Saudi Arabia's 1949 crude output was 174,008,629 barrels, or a 22 percent increase over 1948, with only 76 wells producing as compared to 70 in the previous year. Cumulative production for the country at the end of 1949 was 519,059,853 barrels, produced in 13 years.

There were 22 field wells drilled during the year, 11 of them being in the Abqaiq field, 5 in the Ain Dar field, 1 gas well in the Dammam field, 3 wells in the Qatif field, and 2 field wells in the Haradh area after the initial discovery. The Ain Dar, Abu Hadriya, Fadhili, and Haradh fields are all potentially productive, but as yet there are no facilities for handling the production and the fields are shut in, although development drilling continues as rigs are available. Production not previously shown for the Abu Hadriya field is oil produced during the first year of development of the field.

Of the two wildcats completed during 1949, Fadhili 1 was the deepest, being bottomed at 10,675-feet with production found at 9786-feet in limestone. The other wildcat, Haradh 1,

Oil Production and Producing Wells in Saudi Arabia and Bahrein

COUNTRY and FIELD	Operating Company	Year of Discovery	Est Proven Area (Acres)	Producing Oil Wells End of 1949	CRUDE OIL PRODUCTION—(Barrels) Daily at End of 1949	Year 1948	Year 1949	Cumulative Through 1949
SAUDI ARABIA:								
Abqaiq	Arabian American Oil Co	1941	70,800	42	365,372	105,902,423	138,080,401	321,995,813
Ain Dar		1948	26,300	....	.....	.....	.....	.....
Abu Hadriya		1940	.....	....	.....	.....	.....	9,579
Dammam		1936	9,100	31	91,156	33,426,992	31,366,265	186,439,980
Fadhili		1949	.....	....	.....	.....	.....	.....
Haradh		1949	8,500	....	.....	.....	.....	.....
Qatif		1945	15,300	3	5,835	3,523,574	4,561,963	10,614,481
Total	.....	....	60,000	76	462,363	142,852,989	174,008,629	519,059,853
BAHREIN:								
Bahrein	Bahrein Petroleum Co., Ltd.	1932	10,000	67	30,097	10,914,905	10,985,484	109,899,555

Drilling and Geological Data on Saudi Arabia and Bahrein Fields

COUNTRY and FIELD	Wells Completed in 1948 Oil	Total Wells	Total Footage	Wells Completed in 1949 Oil	Gas	Dry	Total Wells	Total Footage	Wells Drilling End of 1949	Gravity Oil API	PRODUCING FORMATION Name	Kind	Age	Depth (Feet) Minimum to Top of Pay	Avge. Thickness of Pay	Type of Structure
SAUDI ARABIA:																
Abqaiq	18	18	117,471	8	..	3	11	.....	2	39	Arab	Lime	Jurassic	5600	245	Anticline
Ain Dar	2	2	14,100	5	..	..	5	.....	1	34	Arab	Lime	Jurassic	6623	162	Anticline
Abu Hadriya	..	..	.....	..	..	..	..	.....	..	36	Hadriya	Lime	Jurassic	10115	120	.....
Dammam	..	..	.....	..	1	..	1	.....	..	34	Bahrein	.....	Cretaceous	....	....	Faulted
											Arab	.....	Jurassic	4200	400	Dome
Fadhili	..	..	.....	1	..	..	1	.....	..	38	Fadhili	Lime	Jurassic	9786	....	.....
Haradh	..	..	.....	2	..	..	2	.....	1	34	Arab	Lime	Jurassic	6185	....	Anticline
Qatif	4	4	25,792	3	..	..	3	.....	1	30–38	Arab	Lime	Jurassic	6912	187	Anticline
Total	24	24	157,363	19	1	3	23	152,460	5	..	.....	.....	.....	....	....	.....
BAHREIN:																
Bahrein	..	..	.....	2	..	..	2	4,600	..	33.5	Bahrein	Lime	Cretaceous	2000	200	Anticlinal Dome

SAUDI ARABIA - BAHREIN—Continued

was bottomed at 6477 feet with production found at 6185 feet in limestone.

There are now 233.2 miles of pipe line in use in Saudi Arabia connecting the producing fields to the Ras Tanura refinery. Under construction are two long lines. One from Qatif to Quisuma will be 270 miles long and one from Quisuma to Sidon, Lebanon, will be 753 miles long. Both will be 30- and 31-inch combinations. While the two lines will essentially be one unit they are considered separate projects by Trans-Arabian Pipe Line Company.

In addition to geological and geophysical crews operating on most of the country's land surface, a great deal of offshore marine surveying is being carried on in the Persian Gulf. A complex net of transmitting stations has been set up along the shores of Saudi Arabia and Bahrein Island for the purpose of fixing the location of survey launches as they carry on their work.

Drilling operations began late in 1949 in the neutral zone established between Saudi Arabia and Kuwait will have some future bearing on Saudi Arabian oil potentials as well as those of Kuwait. American Independent Oil Company will take the first well to 5000 feet and future drilling and development work will be carried on by Aminoil in the interests of themselves and Pacific Western Oil Company.

Bahrein Island gained about 70,000 barrels of oil from its field in 1949 over the 1948 figure. Two field wells drilled during the year were both productive, and one deep wildcat was suspended at 10,078 feet. Another wildcat was drilling at 5110 feet at the end of 1949. Operations on the island are carried on by Bahrein Petroleum Company, Ltd., a company jointly formed by U. S. interests.

Half interest in the Dhahran-Bahrein pipe line connecting the island to the Dammam field in Saudi Arabia is owned by Bahrein Petroleum Company, Ltd. The 150,000-barrel capacity Bahrein refinery processes crude from both the Bahrein and Dammam fields and usually operates under full capacity.

The oil companies operating in Saudi Arabia and Bahrein, as well as those in Kuwait are either American owned or a large share of the capital comes from the U. S. It is important to these companies to get Tapline, now under construction, to the Mediterranean coast so oil stocks can be distributed to European markets and other oil-short countries. The added incentive to speed up this pipe line construction has been furnished by Iraq Petroleum Company, largely owned by British capital, which is building a similar pipe line from Iraq.

American companies in the Middle East have not followed a program of ruthless exploitation, however, in spite of the pressure being exerted to retain markets for the oil. The standing of all oil companies is especially good in Saudi Arabia where a vast modernization program is under way to improve the living and working conditions of the Arabs.

Refineries in Saudi Arabia and Bahrein

COMPANY	Location of Plant	Crude Charging Capacity (Bbls. Daily)	Cracking Capacity (Barrels Daily)	Daily Crude Runs End of 1949 (Bbls.)	Type of Refinery
SAUDI ARABIA:					
Arabian American Oil Co.	Ras Tanura	140,000	20,000 Reforming	111,000	Crude Still Reforming
BAHREIN:					
Bahrein Petroleum Co.	Bahrein Isl.	150,000	15,000 Thermal cracking; 20,000 Thermal reforming; 11,000 Fluid Catalytic Cracking	150,000	Crude Still Reforming Cracking Asphalt

Crude Oil Pipe Lines of Saudi Arabia

COMPANY	Origin	Terminus	Length (Miles)	Diameter (Inches)	Capacity	Year Completed
Arabian American Oil Co.	Abqaiq	Dhahran	40	14	105,000	1947
	Abqaiq	Dhahran	38½	12 & 14	100,000	1946
	Qatif	Ras Tanura	18	20 & 22	273,000	....
	Abqaiq	Qatif	48	30	315,000	....
	Qatif	Qaisuma	270	30 & 31	.....	Building
	Dhahran	Ras Tanura	23	12	123,000	1946
	Dhahran	Ras Tanura	35	10	65,000	1939
	*Dhahran	Bahrein	34	12	125,000	1945
Trans-Arabian Pipe Line Co.	Qaisuma	Sidon-Lebanon	753	30 & 31	330,000	Building

* Owned half by Bahrein Petroleum Co.

REFINED PRODUCTS LINES Ras Tanura Terminal to loading wharf

TURKEY

TURKEY is gradually developing her known and potential oil supply. Mining Research and Exploration Institute of Turkey is presently the only operating agency in the country concerned with petroleum development. The Ramandag field in Southeastern Turkey, the only active producer, had four wells at mid-1949 with a combined output of about 3000 barrels daily. Three active drilling rigs in the area are attempting to outline the extent of the field. The proven area of the field is about 2560 acres and one deep test was drilled to determine the underlying stratigraphy of the general area.

Wildcat drilling is being carried out in scattered sections of the country. One well was drilling in the Adana-Kodjaeli region, north of Syria, and another test was started at Adzikara in the same area. Drilling operations have been contracted with Drilling and Exploration Company of Dallas, but the Turkish minister of economy emphasized that no concessions would be granted outside interests in actual exploitation of oil. Much of the country's reluctance to grant concessions to foreign operators stems from litigation which developed over oil rights granted U. S. and German interests in 1901, and a later agreement in 1917 with Britain and France.

There are several divergent estimates of Turkey's oil potential. Officials of the government company maintain that the Ramandag field alone should be capable of replacing all imported petroleum with the exception of a few by-products. They estimate that the field will have a proven area of about ten square miles and recoverable reserves in excess of 250 million barrels. The government agency does not now have the necessary finances to develop the field, and is not too anxious to prove the reserves because of the proximity of the Soviet Union. The remainder of Turkey's oil deposits have been estimated on the basis of oil seeps on the surface and no quantitative analysis is possible from this. These oil seeps are prevalent throughout the entire country.

Two small topping plants exist in the Ramandag field with combined capacities of 550 barrels daily and some oil is used for road surfacing as it comes from the wells. The 15-gravity oil is also used successfully as boiler fuel on locomotives.

BURMA

BURMA'S oil production dropped in 1949 to 260,292 barrels as compared with 339,370 barrels in 1948. Daily average production at the end of 1949 stood at 572 barrels indicating that production for 1950 will probably continue to decrease. Much postwar work has been carried on to rehabilitate the properties destroyed during the last war but civil strife in Burma continues to hamper present activities.

Under the present unsettled internal conditions in Burma the oil fields have been completely cut off from government controlled sections except by air or by occasional river convoys between Chauk and Mandalay. In spite of difficult communications Burmah Oil Company, Ltd., has been able to carry on some repair work in the Chauk and Lanywa fields. The Minbu, Yenangyaung, and Yenangyat fields have been completely isolated by fighting.

No new drilling has been carried on since the war and there are grave doubts that present fields will continue to produce at efficient rates with the looting of equipment that has been prevalent in the past few months. It is next to impossible to move the oil out of the fields once it is produced, so most of the wells are being shut in.

Burmah Oil has been forced to reduce the number of field employes from 2500 to 750 owing to the unsettled state of the country and the absence of the foreseeable prospect of carrying on the oil field and pipe line rehabilitation program initially planned. At one time the Burmese government suggested acquiring a share of the business to expedite reconstruction work but nothing has come of the plan. Meanwhile the British government withdrew its support of the company whereby they had tacitly guaranteed the company against some future losses in Burmese operations.

Since Burma became an independent nation in January, 1948, a new constitution for the country specifically states that development of natural resources must either be in the hands of the state or of corporations with a majority of Burmese capital. Considering the country's prewar daily production of more than 21,000 barrels the present situation calls for direct action on the part of Burmese government agencies. Recognizing the rapid deterioration of one of Burma's most important industries, the foreign minister indicated that foreign capital would be invited to participate in oil operations on a limited basis in the future. Because of the present internal warfare outside companies are not eager to enter the Burmese oil picture.

CHINA

OIL production figures from China are no longer available since the Communist conquest. The Yumen fields in Kensu Province are said to have averaged about 1200 barrels a day during 1949 according to industry sources in the U. S. All Yumen production is consumed locally. Some gas production was reported during the year in Szechwan Province in Central China, but the quantity was too small to be significant.

The lack of large oil output in China has not been a great problem in the past. Total yearly consumption probably did not exceed 15 million barrels because the country as a whole is not mechanized, either industrially or militarily. However, China does have large areas suitable for the origin and accumulation of oil and demand will probably increase as Russia attempts to bolster her outside sources of petroleum products. In view of the Soviet Union's recent trade agreement with Communist China, some exploratory work will probably be carried on in prospective oil areas to develop petroleum as a trade commodity. If any of this work is carried on, the countries outside of the Red orbit will probably not be aware of it. The fact that the Soviet Union recently announced the formation of a joint Russian-Red Chinese company to develop oil resources in the western province of Sinkiang does not necessarily mean the company will be very aggressive. Russia is scarcely in a position to furnish drilling equipment needed for the work and China has little such equipment.

The island of Formosa, only Chinese territory held by the Nationalist government in early summer, produces a small amount of petroleum from the Miaolee and Sinying fields. The bulk of Nationalist petroleum needs are supplied by imports from the Middle East. The Kaohsiueng refinery on the island currently processes 10,000 barrels a day in one unit and 7500 barrels in the other.

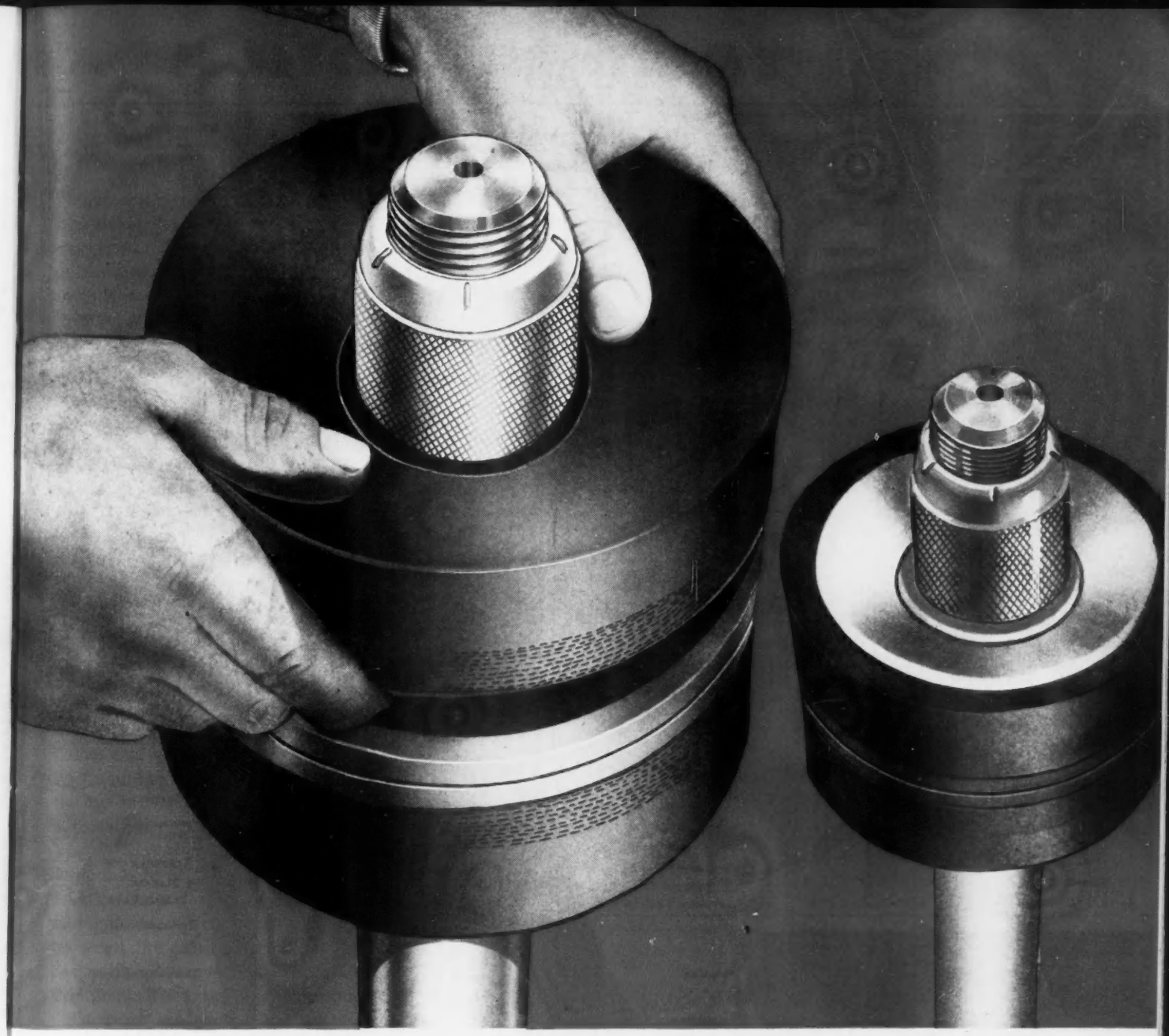
On the mainland, the only important source of oil to the Communists is thought to be a shale-oil processing refinery in Manchuria.

INDIA

INDIA'S 1949 production was 1,950,000 barrels, a 20,000-barrel increase over the 1948 figure. All production in the country is from the Digboi field in northeastern Assam, which is operated by Assam Oil Company, a subsidiary of Burmah Oil Company. Development drilling proceeded during the year with special emphasis on the eastern section of the field. The Digboi field is developed in an anticlinal structure with production from 2000 to 5000 feet.

Exploratory work continued throughout the year with no new prospects found. A wildcat drilled by Burmah Oil into the Tiru Hills anticline on the south side of the Brahmaputra Valley was dry. Shallow drilling by Assam Oil in the Makum-Namdang area ten miles south of Digboi failed to produce favorable indications. Burmah Oil has moved a rig to the Barsilla area, a remote spot in the upper Assam jungles, for a test. Standard-Vacuum Oil Company is making exploration surveys in parts of Assam which may lead to test drilling. Officials emphasized that work thus far has consisted only of the most elementary studies.

The Indian Transport Ministry announced late in 1949 that the government would reduce civilian consumption quotas of oil by 3 percent due to sterling difficulties in foreign trade. The government followed with the information that after January 1, 1950, no more dollar oil would be imported into the country.



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MISSION "Silver Top" Slush Pump Valve

MISSION "Super-Service" Slush Pump Valve

Why go to the expense of renewing the entire piston when you need only renew the rubbers?

When MISSION Piston Rubbers wear out, only new rubbers are needed, and they are quickly installed at the rig, *without, in most cases, removing the piston from the rod.*

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MISSION Super-Surfaced Rod

MISSION SLUSH PUMP PARTS

G-140

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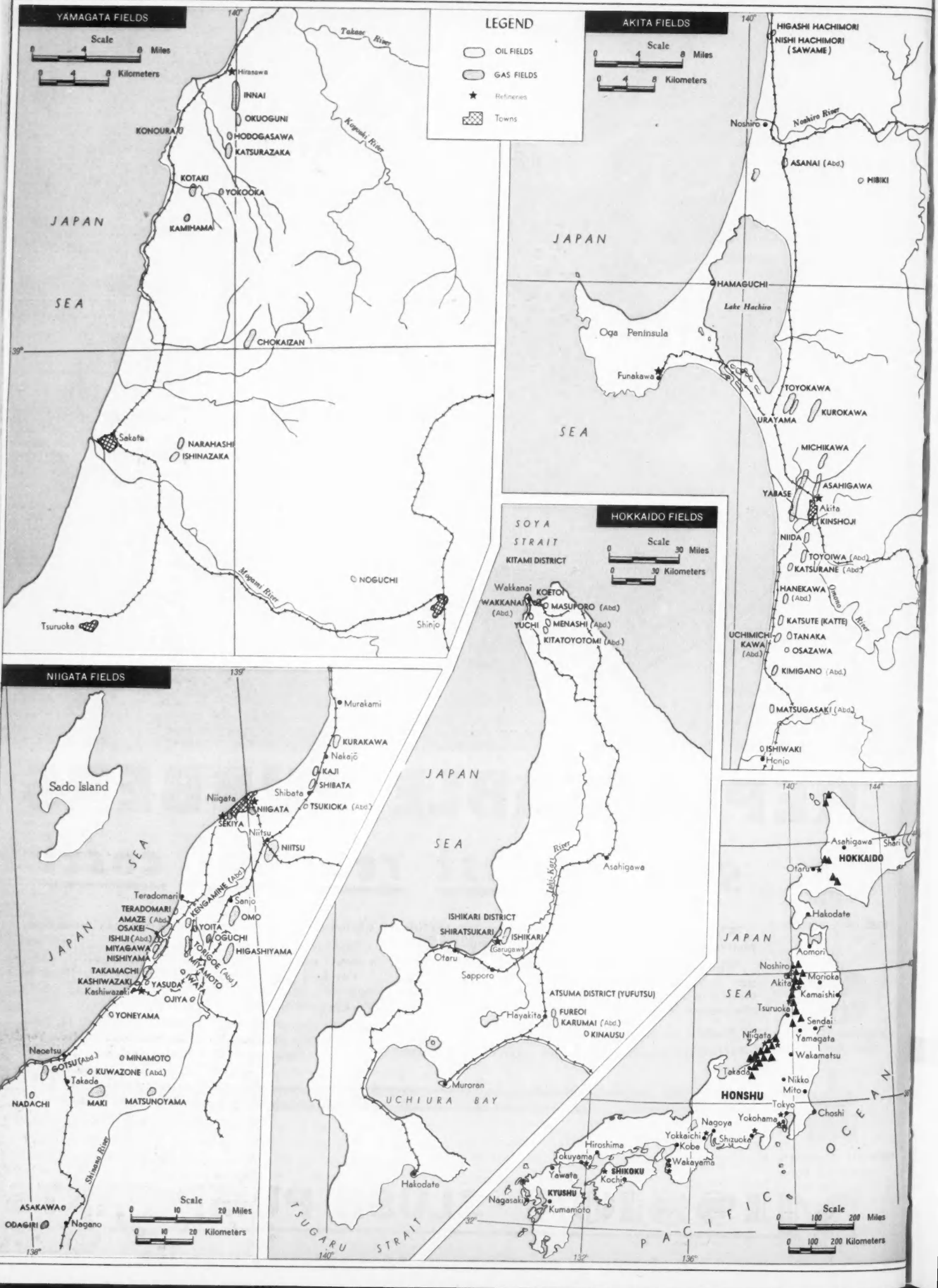
JAPAN


YAMAGATA FIELDS
Scale
0 4 8 Miles
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LEGEND
OIL FIELDS
GAS FIELDS
Refineries
Towns
AKITA FIELDS
Scale
0 4 8 Miles
0 4 8 Kilometers
HOKKAIDO FIELDS
Scale
0 30 Miles
0 30 Kilometers
NIIGATA FIELDS
Scale
0 10 20 Miles
0 10 20 Kilometers
Scale
0 100 200 Miles
0 100 200 Kilometers
JAPAN SEA
PACIFIC OCEAN
Hirosawa
INNAI
OKUOGUNI
KONOURA
HODOGASAWA
KATSURAZAKA
KOTAKI
YOKOOKA
KAMIHAMA
CHOKAIZAN
Sakata
NARAHASHI
ISHINAZAKA
NOGUCHI
Tsuruoka
Shinjo
Takase River
Kopiaki River
Mogami River
HIGASHI HACHIMORI
NISHI HACHIMORI (SAWAME)
Noshiro
Noshiro River
ASANAI (Abd.)
HIBIKI
HAMAGUCHI
Lake Hachiro
Oga Peninsula
Funakawa
TOYOKAWA
KUROKAWA
URAYAMA
MICHIKAWA
ASAHIGAWA
YABASE
Akita
KINSHOJI
NIIDA
TOYOIWA (Abd.)
KATSURANE (Abd.)
HANEKAWA (Abd.)
Omono River
KATSUTE (KATTE)
UCHIMICHI-KAWA (Abd.)
TANAKA
OSAZAWA
KIMIGANO (Abd.)
MATSUGASAKI (Abd.)
ISHIWAKI
Honjo
SOYA STRAIT
KITAMI DISTRICT
Wakkanai
WAKKANAI (Abd.)
KOETOI
MASUPORO (Abd.)
YUCHI
MENASHI (Abd.)
KITATOYOTOMI (Abd.)
Sado Island
Murakami
KURAKAWA
Nakajō
KAJI
SHIBATA
Niigata
NIIGATA
TSUKIOKA (Abd.)
SEKIYA
Niitsu
NIITSU
Shibata
Teradomari
TERADOMARI
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OSAKI
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TAKAMACHI
KASHIWAZAKI
Kashiwazaki
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YONEYAMA
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Senjo
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OGUCHI
HIGASHIYAMA
TORIGOE (Abd.)
MIYAMOTO
IWATA
Neoetsu
GOTSU (Abd.)
MINAMOTO
KUWAZONE (Abd.)
Takada
NADACHI
MAKI
MATSUNOYAMA
Shinano River
ASAKAWA
ODAGIRI
Nagano
ISHIKARI DISTRICT
SHIRATSUKARI
ISHIKARI
(Garugawa)
Otaru
Sapporo
Hayakita
ATSUMA DISTRICT (YUFUTSU)
FUREOI
KARUMAI (Abd.)
KINAUSU
Muroran
UCHIURA BAY
Hakodate
TSUGARU STRAIT
Ishikari River
Asahigawa
HOKKAIDO
Asahigawa
Shari
Otaru
Hakodate
Aomori
Noshiro
Akita
Morioka
Kamaishi
Tsuruoka
Sendai
Niigata
Yamagata
Wakamatsu
Takada
Nikko
Mito
HONSHU
Tokyo
Choshi
Yokohama
Nagoya
Yokkaichi
Kobe
Shizuoka
Hiroshima
Wakayama
Tokuyama
Yawata
SHIKOKU
Kochi
KYUSHU
Nagasaki
Kumamoto

A RIG SIDE CHAT

about Baker Retainer Production Packers

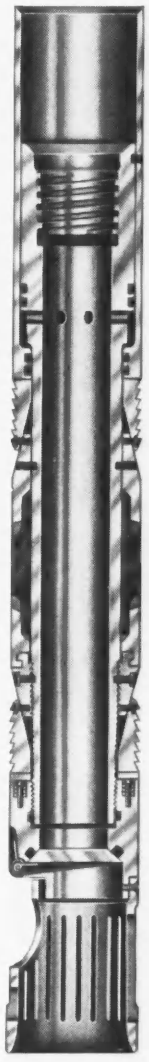
What we want to talk about today is how the Baker Production Packer is set securely in the casing, anchored against either upward or downward movement, with the tubing production string left free from the packer. The tubing is run through the body of the packer for production, and is free to be pulled at any time without disturbing the packer. In the typical application drawing (far right) the packer has been set and anchored to the casing by the two sets of opposing slips, with the Hycar packing unit sealed-off against the casing and retained in position by lead seals.

We want to produce from a zone below the packer so we make up the string with a Baker Perforated Production Tube on bottom (with operator's tubing to provide an additional stinger, if desired); above is a Baker Multi-V Tubing Seal Nipple; next a No Left Turn Latching Sub; and above that comes the tubing. Now we run-in the well until the Latching Sub engages in the top of the packer. The engaged Sub automatically positions the Multi-V Tubing Seal Nipple accurately in the smooth bore of the packer, and with 5 Hycar rings facing up and 5 more facing down, a perfect seal is obtained between the tubing string and the packer bore. Meanwhile, the Perforated Production Tube, as it was run through the bore of the packer, has unseated the Flapper Valve and now holds it in open position.

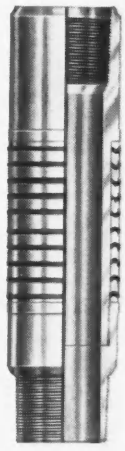
It's as simple as that, and we are ready to produce through the ⅜-inch holes in the Perforated Production Tube. These holes prevent junk, debris and large pieces of shale from entering and clogging the production string; and the total area of all holes is equal to or greater than the area of the tubing string.

When the tubing string is pulled at some future time, the Flapper Valve in the lower end of the packer body snaps back into the closed position and maintains a fluid-tight seal against upward pressure from below. The packer is not disturbed by pulling the tubing string, but remains packed-off against the casing ready for future operations.

This is only one of the many applications of the Baker Retainer Production Packer for single-zone or multiple-zone production; for selective testing and acidizing; for protection of casing from pressure or from destructive fluids, or gases; and other profitable uses.

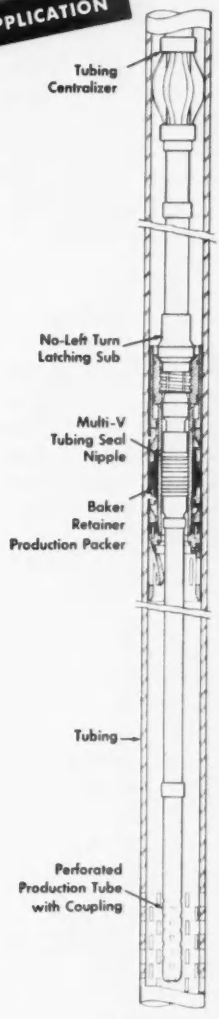


Baker Model "D" Retainer Production Packer Product No. 415-D



BAKER TUBING SEAL NIPPLE, MULTI-V TYPE, which effects a fluid-tight seal between the tubing string and the bore of the Packer.

TYPICAL APPLICATION



Single zone hook-up with production string anchored to packer, for: (a) keeping production string in tension to eliminate "tubing breathing" during the pumping cycle; (b) producing by flowing, without imposing excessive weight on packer to hold Tubing Seal Nipple positioned in packer bore; (c) making high pressure injection of gas or fluid for re-pressuring or secondary recovery.

Production string is run-in until No Left Turn Latching Sub rests on top of packer, indicated by drop in weight on strain gauge or weight indicator. The production string is then raised about 5 feet, and the zone washed and brought in, if it will flow.

If you would like to continue this rig-side chat at any well where you have a production packer problem, call the nearest Baker "Service Engineer." He will have helpful suggestions, and he is as near as your telephone . . .

Abilene 6820; Bakersfield 2-7487; Bay City 3328; Beaumont 4-5171; Brookhaven 1438; Casper 972; Cheyenne 2-4959; Cody 434; Coalinga 174; Corpus Christi 2-2251; Dallas, Riverside 4042; Duncan 3084; Elk City 188; Falfurrias 197-W; Great Bend 5681; Guymon 644; Harvey, (New Orleans Exchange) Uptown 3966; Hobbs 889-R; Houston, Wayside 2107; Kilgore 688; Lake Charles 6-5304; Levelland 246-J; Los Angeles, JEfferson 8211; Magnolia 980; Natchez 181; Newcastle 379; Odessa 4932; Oklahoma City 58-4445; Olney 482; Santa Maria 648-W; Scott, Lafayette 2219-W; Shreveport 4-1724; Taft 5-2355; Thermopolis 248-J; Tulsa 2-8083; Ventura, Miller 3-3800; Victoria 314; Wichita Falls 2-4776.

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BAKER

RETAINER PRODUCTION PACKER

PRODUCT NO. 415-D

PAKISTAN

PAKISTAN'S crude production continues to increase each year and 936,000 barrels were produced in 1949 as compared with 560,000 the previous year. Khaur, Dhulian, Joya Mair and Balkassar are the fields now producing in the country. This production for 1949 represents an increase of three times the 1947 production.

Three wells were completed during the year in the Balkassar field, two by Attock Oil Company and one by Burmah Oil Company (Pakistan Concessions) Limited. Attock Oil also continued drilling on the Meyal structure west of Dhulian. Burmah Oil was drilling on the Lakhra anticline about 100 miles northeast of Karachi. The latter test, which was at about 4800 feet at the beginning of the year, was drilling at 12,000 feet in Cretaceous shale at year's end. A successful completion by Burmah Oil near Rawalpindi, Punjab, was reported to have tested more than 2000 barrels a day.

The Pakistan government is attempting to encourage further oil exploration in the country. Regulations for issuing concession permits were revised making this a function of the dominion government and leaving the percentage of capital to be offered to Pakistan at 30 percent.

Pakistan has adequate refining facilities to handle the domestic production. A refinery at Rawalpindi has a throughput capacity of 6500 barrels a day, including 2500 barrels cracking capacity.

JAPAN

JAPAN's crude production during 1949 averaged 3748 barrels a day, an increase of 22 percent over the 3070-barrel average for 1948. Production of 1,368,050 barrels of crude, including 15,240 barrels of natural gasoline, during 1949 was the highest annual production since 1945 and marked the first significant uptrend since the decline which began in 1938. Producing wells at the end of 1949 numbered 3164, compared with 3712 in March, 1948. Of the 63 field wells drilled during the year for a total footage of 149,066 feet, 34 were successful producers. These new wells accounted for about 10 percent of the annual production.

Most of the new wells drilled in 1949 were extensions of old fields and exploitation of deep production in the Yabase and Narahashi fields. New reserves were developed by test drilling in Hachimori field, Akita Prefecture, Narahashi field, Yamagata Prefecture, Kaji field, and the Betsuyama block of Nishiyama field, Niigata Prefecture, and a new shallow pool discovered in Kaji field. These minor discoveries contributed about 250,000 barrels of new reserves.

Most significant discovery was the deep zone found at about 4200 feet in Yabase field, which was proved to extend south at least 12,500 feet from the extreme north end of the field where it was first found to be productive. A new test proved that the five wells now producing from this deep zone have penetrated less than half the full thickness of the section. This well has also found two deeper zones at 4600 and 5500 feet. The 4200-foot zone in Yabase has been credited with an estimated recoverable reserve of 6.3 million barrels.

During the year the northern part of a large structure immediately west of and parallel to the large Yabase field was outlined in detail by seismic reflection and two culminations are indicated on the anticline; a test well location was selected for drilling early in 1950. Geophysical exploration

Refineries of Japan

COMPANY	Location of Plant	Crude Charging Capacity, (Bbls. Daily)	Cracking Capacity, (Bbls. Daily)	Daily Crude Runs End of 1949 (Bbls.)	Type of Refinery
AKITA:					
Nippon Oil Company	Akita	3962	None	1200	Complete
	Funakawa	2516	None	767	Complete
Showa Oil Company	Hirasawa	943	None	421	Complete
HOKKAIDO:					
Nippon Oil Company	Hokkaido	252	None	....	Complete
KANAGAWA:					
Koa Oil Company	Merifu	5000	3000	....	Skimming, Cracking
Mitsubishi Oil Company	Kawasaki	5000	2500	....	Skimming, Cracking
Nippon Oil Company	Yohohama	5000	None	....	Complete
Showa Oil Company	Kawasaki	5000	None	....	Complete
MATSUYAMA:					
Maruzen Oil Company	Matsuyama	1800	None	....	Skimming
MIE:					
Daikyo Oil Company	Yokkaichi	1500	None	....	Lube, Asphalt
NIIGATA:					
Nippon Oil Company	Kaskiwazaki	1258	None	480	Complete
	Niigata	2012	None	635	Complete
Showa Oil Company	Niigata	1274	None	482	Complete
SHIZUOKA:					
Toa Fuel Company	Shimizu	5000	None	....	Complete
WAKAYAMA:					
Maruzen Oil Company	Shimotsu	3000	None	....	Complete
Toa Fuel Company	Wakayama	6000	None	....	Skimming
YAMAGUCHI:					
Nippon Oil Company	Kudamatsu	5000	None	....	Complete

Drilling in Japan

PREFECTURE and FIELDS	WELLS COMPLETED IN 1948					WELLS COMPLETED IN 1949					Wells Drilling End 1949
				Total					Total		
	Oil	Gas	Dry	Wells	Footage	Oil	Gas	Dry	Wells	Footage	
AKITA											
Hachimori	..	..	..	..	.....	3	..	2	5	8,108	1
Hibiki	..	..	..	..	.....	..	..	..	..	.....	1
Higashi-Hachimori	..	..	1	1	1,380	..	..	..	..	.....	..
Kemeda	1	..	..	1	756	..	..	..	..	.....	..
Kamihama	1	..	1	2	3,296	..	..	..	..	.....	..
Katsurazaka	..	..	1	1	3,120	..	..	..	..	.....	..
Koya	..	..	..	..	.....	4	..	1	5	17,471	2
Nishi-Hachimori	1	1	1	3	5,937	..	..	..	..	.....	..
Omonogawa	..	..	..	..	.....	4	..	..	4	5,364	..
Sawame	1	..	2	3	5,380	1	..	2	3	5,047	..
Sotoasahikawa	..	..	..	..	.....	4	..	..	4	17,305	2
Yabase	7	..	5	12	30,003	2	..	..	2	6,642	1
Wildcats	..	..	..	..	.....	..	..	3	3	7,570	2
GUMMA											
Haraichi	..	..	..	..	.....	..	..	..	..	.....	1
HOKKAIDO											
Wildcats	..	1	..	1	2,835	..	..	..	..	.....	1
IWATE											
Wildcats	..	..	..	..	.....	..	..	..	..	.....	2
NIIGATA											
Betsuyama	1	..	..	1	5,290	2	..	..	2	10,247	2
Gozu	..	..	..	..	.....	1	1	..	2	7,115	..
Haguro	4	..	1	5	4,380	..	..	2	2	2,982	..
Imo	..	..	..	..	.....	..	..	1	1	3,330	..
Ishiji	..	..	..	..	.....	..	..	1	1	3,527	..
Kaji	2	..	..	2	5,155	2	..	..	2	4,215	1
Kajikawa	..	..	..	..	.....	1	..	2	3	7,750	2
Kurokawa	4	..	1	5	5,737	2	..	..	2	1,919	3
Nakajo	..	..	1	1	1,640	..	..	2	2	3,400	..
Niigata	..	..	..	..	.....	..	3	..	3	4,496	2
Sekiya	..	..	..	..	.....	..	3	..	3	5,463	..
Shibata	..	1	1	2	5,830	..	..	..	..	.....	..
Tsubame	..	..	..	..	.....	..	2	1	3	4,244	..
Wildcats	..	..	3	3	8,360	..	..	5	5	13,762	2
SHIZUOKA											
Yaizu	..	..	..	..	.....	..	..	..	..	.....	1
TOKYO											
Wildcats	..	..	..	..	.....	..	..	..	..	.....	1
YAMAGATA											
Innai	..	..	..	..	.....	..	..	1	1	4,122	1
Narahashi	3	..	5	8	9,192	8	..	1	9	6,947	1
Nishi-Ishinazaka	..	..	1	1	980	..	..	2	2	3,214	..
Wildcats	1	..	..	1	739	..	..	3	3	9,044	4
Total	26	3	24	50	100,010	34	9	29	72	163,284	33

was considerably accelerated by the use of two new portable seismic reflection units and two gravity meters which arrived from the U. S. in July.

Crude production during 1950 is expected to show an increase of more than 50 percent over that of 1949. Production in January, 1950, was 155,050 barrels without any new wells being brought into production and the trend is expected to continue. The increase in 1950 will be largely due to Imperial Oil Company Ltd.'s, exploitation of the deep zones of the Yabase field for which 20 new wells have been scheduled.

Oil Production and Producing Wells in Japan

PREFECTURE and FIELD	Operating Company	Year of Discovery	Producing Oil Wells End of 1949	CRUDE OIL PRODUCTION—(Barrels) Daily End of 1949	Fiscal Year 1947-1948	Calendar Year 1949	Cumulative Through 1949
AKITA:							
Asahikawa	Imperial Oil Company, Karuta Industrial Company	1908	170	57	19,659	20,285	7,382,756
Michikawa	Imperial Oil Company, Karuta Industrial Company	1922		64	19,505	29,242	
Asanai	Imperial Oil Company	1940	n.a.	....	1,112	.....	5,936
Hachimori	Imperial Oil Company, Daido Oil Company, Nippon Mining Company, Fuji Mining Company, Eguchi Oil Association	1938	45	187	142,515	71,138	555,267
Hanekawa	Imperial Oil Company	1919	22	10	2,959	3,824	215,834
Hibiki	Nichibei Oil Mining Company	....	6	13	.....	1,271	2,347
Innai	Imperial Oil Company	1922	123	370	99,054	119,982	4,290,739
Iwako	Imperial Oil Company	1939	....	....	.....	.....	9,950
Kamihama	Imperial Oil Company	1940	13	89	16,124	19,499	91,917
Kamioguni	Imperial Oil Company	....	62	76	19,451	23,946	1,140,946
Katsurane	Imperial Oil Company	1919	64	22	6,431	7,837	713,713
Katsurazaka	Imperial Oil Company	1928	22	77	28,997	26,808	338,565
Katte	Imperial Oil Company	1919	66	23	8,799	8,768	1,194,892
Kotaki	Imperial Oil Company	1938	37	34	10,136	12,819	193,699
Kurokawa	Imperial Oil Company	1912	99	81	20,576	20,606	7,362,112
Matsugasaki	Imperial Oil Company	1941	....	....	.....	.....	335
Niida	Imperial Oil Company	1938	5	8	2,880	2,579	127,382
Sakaki	Imperial Oil Company	....	....	3	.....	1,466	8,317
Tanaka	Imperial Oil Company	....	....	....	.....	.....	557
Toyoiwa	Imperial Oil Company	1902	4	7	2,213	3,560	30,380
Toyokawa	Daido Oil Company, Imperial Oil Co.	1912	195	83	16,962	25,900	5,097,402
Urayama	Imperial Oil Company	1912	63	26	7,205	8,485	
Uchimichikawa	Imperial Oil Company	1921	....	....	107	31	31,881
Yabase	Imperial Oil Company	1934	306	1,515	451,937	459,214	10,100,119
Total Akita		....	1,302	2,745	876,622	867,260	38,895,045
HOKKAIDO:							
Atsuta	Imperial Oil Company	....	8	3	949	969	21,968
Fureoi	Imperial Oil Company	1905	53	20	8,033	6,654	318,371
Ishikari	Imperial Oil Company	1903	87	33	9,933	11,548	877,219
Karumai	Imperial Oil Company	1906	23	9	4,488	3,025	387,101
Kinausu	Hokkaido Oil Development Co.	1936	....	....	.....	.....	126
Kita Toyotomi	Imperial Oil Company	....	....	....	.....	120	143
Koetoi	Imperial Oil Company	1922	6	3	1,481	1,145	30,469
Masuporo	Imperial Oil Company	1923	....	....	309	.....	39,840
Menashi	Imperial Oil Company	1915	4	1	305	226	13,331
Toyotomi	Imperial Oil Company	1930	....	....	276	.....	5,670
Wakkanai	Imperial Oil Company	1914	....	..	279	.....	5,785
Yuchi	Hokkaido Oil Development Company	1939	....	..	234	698	6,541
Total Hokkaido		....	191	69	26,285	24,385	1,706,564
NIIGATA:							
Amaze	Imperial Oil Company	1873	5	1	321	164	2,845
Betsuyama	Imperial Oil Company	....	....	....	.....	.....	366,638
Echigo-Kurokawa	Daido Oil Company, Niigati Oil Association, Imperial Oil Company	1941	119	55	19,391	23,103	167,887
Gozu	Imperial Oil Company	1902	15	8	1,589	4,768	47,600
Higashiyama	Imperial Oil Company	1874	240	194	65,712	70,799	6,979,862
Ishiji	Imperial Oil Company	1934	....	....	404	.....	166,000
Izumozaki	Niigata Oil Association	....	....	1	261	214	25,189
Kaji	Daido Oil Company	1945	4	39	1,807	14,530	30,748
Kajigawa	Imperial Oil Company	....	1	31	.....	8,982	8,982
Kashiwazaki	Imperial Oil Company	1936	4	1	293	195	9,150
Kengamine	Imperial Oil Company	1941	1	1	148	315	705
Kuwazone	Imperial Oil Company	1945	....	....	.....	.....	176
Maki	Imperial Oil Company, Niigati Oil Association	1900	136	13	4,805	4,491	12,329
Miyagawa	Imperial Oil Company	1895	26	6	3,531	2,113	1,939,351
Niitsu	Diado Oil Company, Niigata Oil Association, Imperial Oil Company	1874	674	384	117,121	136,965	18,054,808
Nishiyama	Imperial Oil Company	1898	210	149	46,037	52,628	12,566,235
Omo	Imperial Oil Company	1916	54	30	9,332	10,756	1,350,959
Shibata	Imperial Oil Company	1945	5	23	13,537	8,982	67,624
Takamachi	Imperial Oil Company	1924	80	25	8,311	8,775	3,237,664
Teradomari	Imperial Oil Company	1898	....	....	.....	.....	2,685
Torigoe	Imperial Oil Company	....	43	4	2,533	1,560	84,973
Tsukioka	Daido Oil Company	1941	....	....	7	.....	296
Total Niigata		....	1,617	965	295,140	349,340	45,122,706
SHIZUOKA:							
Sagara	Imperial Oil Company, Saito Oil Co.	1908	3	....	164	150	28,727
YAMAGATA:							
Chokaizan	Imperial Oil Company	1922	20	30	10,065	12,058	371,814
Ishinazaka	Imperial Oil Company	1944	17	172	75,172	54,144	383,679
Narahashi	Imperial Oil Company	1947	13	220	7,459	44,175	55,545
Nishi-Ishinazaka	Imperial Oil Company	....	1	1	.....	541	711
Yadaregawa	Imperial Oil Company	....	....	....	.....	.....	63
Total Yamagata		....	51	423	92,696	110,918	811,812
	Other Small Producers	....	....	....	.....	757	.....
GRAND TOTAL		....	3,164	4,202	1,290,907	1,352,810	86,564,854

N. A.—Not Available.

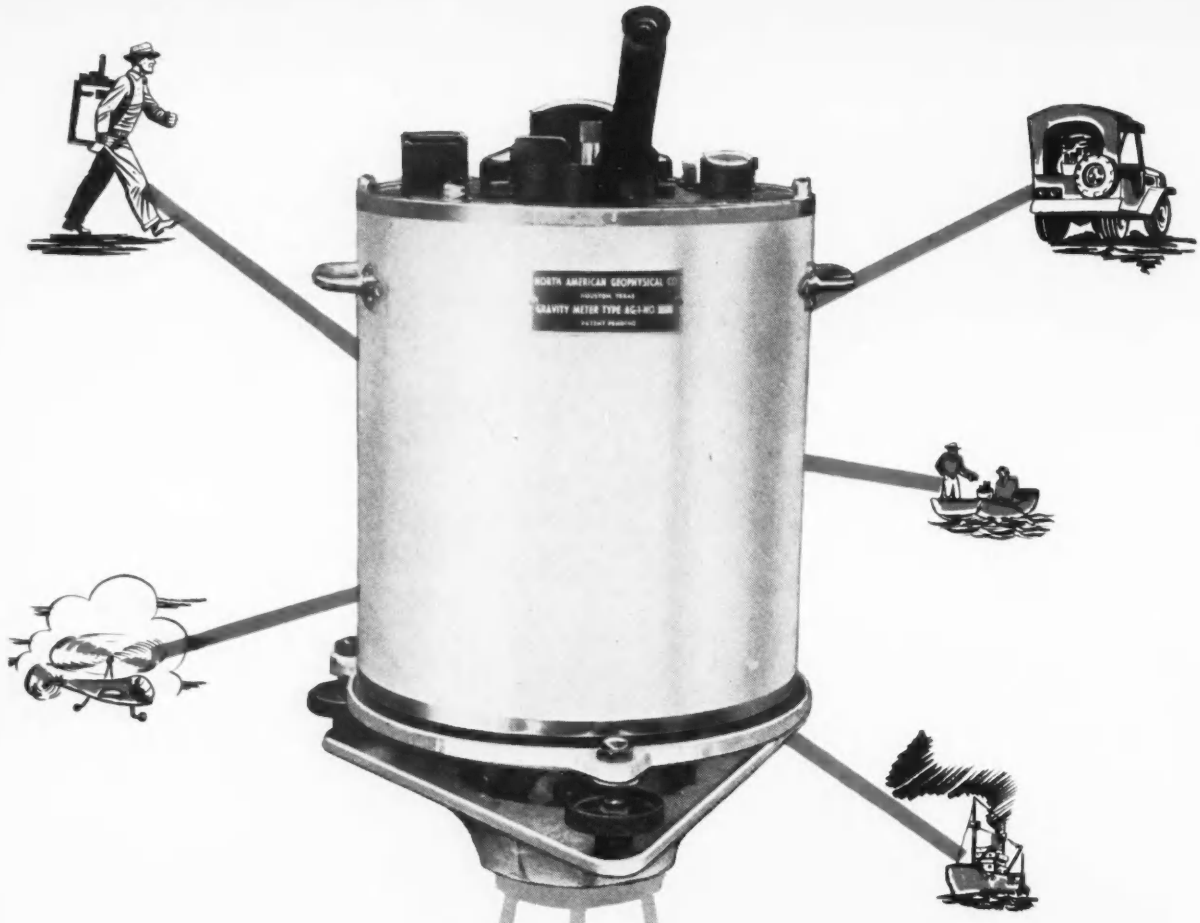
PHILIPPINE ISLANDS

THE Philippines have little oil production at the present time. Some shallow wells have been drilled in the Toledo area of Cebu in past years but production has never been more than a few gallons of heavy oil daily. The Philippine Oil Development Company, the only active exploration company in the islands, drilled its third deep well early this year. Cebu 3 was located near Bagay on the Daanbantayan Peninsula in Cebu and reportedly tested 95,000 cubic feet of gas per day from about 7600 feet. The gas discovery has encouraged further exploration and ten more wells are to be drilled to outline the field. A geologist for the company indicated that 130 wells might be needed to drill up the field if the gas zone is as large as it is now thought to be.

The same company has drilled a well on Bondoc Peninsula in Luzon and it tested about 120 barrels of oil daily early last year. Further drilling in the general area will be carried on to determine the extent of the zone.

Exploration in the Philippines has been discouraged in the past few years by the petroleum law set up by the government in 1939. Under the law no oil leases could be granted to outside interests and the oil prospects have not been good enough to make oil companies ask for an easement of the ruling. Early this year the Republic passed a new petroleum law which permitted the granting of leases to outside operators if Philippine citizens or companies held a 60 percent interest in the venture. This clause will probably discourage larger oil companies from coming into the country but smaller concerns may be interested.

The present Philippine internal situation would not appear to be attractive to foreign capital. The present government is losing its grip on national affairs and the economy is sagging badly. To make matters worse, the rebel Huks have taken over larger areas of the islands.



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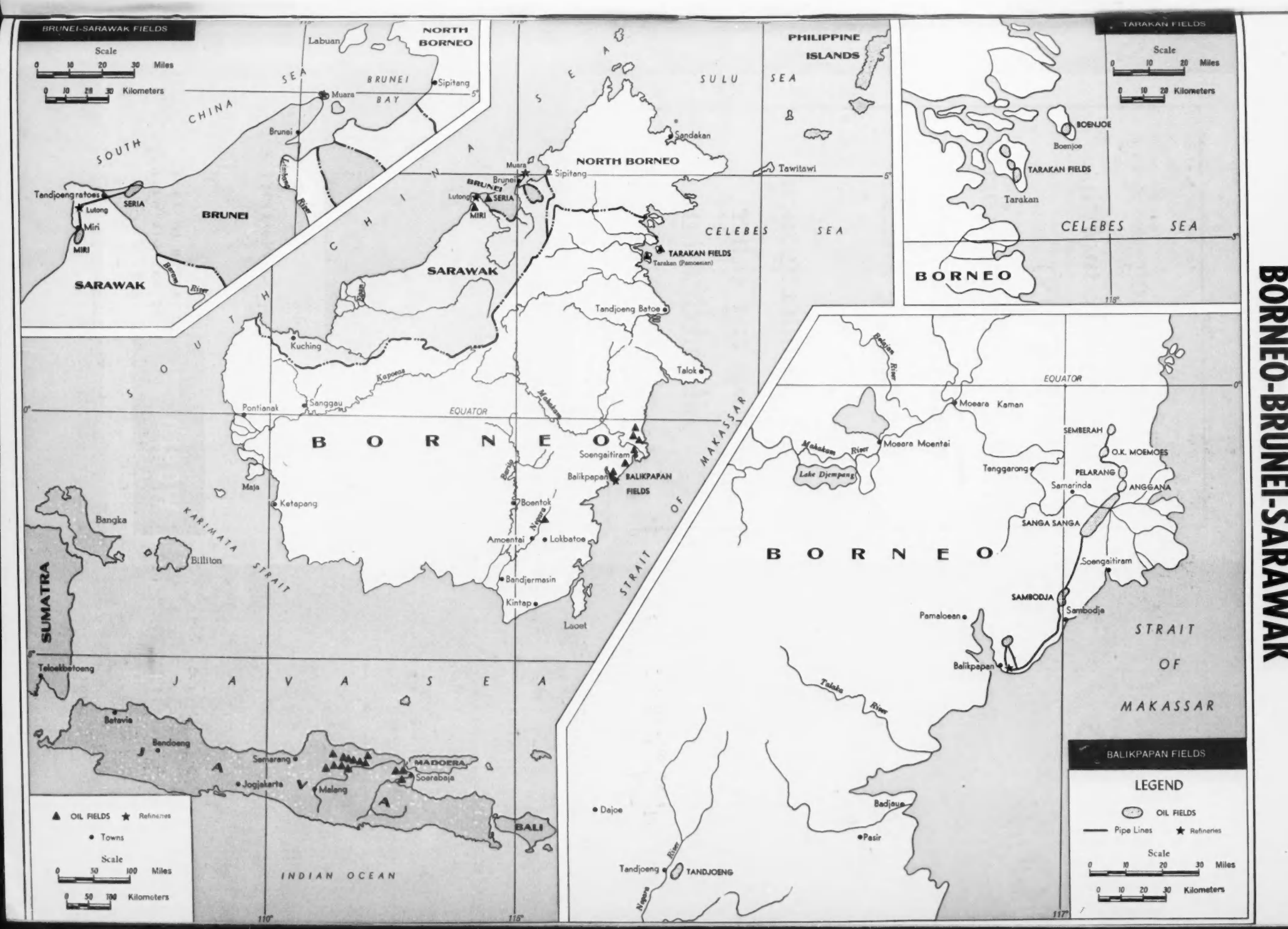

BORNEO-BRUNEI-SARAWAK

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EAST INDIES

THE East Indies posted a large gain in oil production during 1949 with an over-all output of 69,153,470 barrels from the accessible and rehabilitated fields. About half of the region's fields are still inaccessible because of internal strife and many of the war-damaged fields have not been returned to production.

The large gain in the past year was mainly due to the reactivated Badjoebang, Kenali Asam, and Tempino fields in southern Sumatra and further repairs in the Tandjoeng Tiga field. Oil output now exceeds the 1947 production figure more than three times. The Brunei and Netherlands New Guinea areas also registered big gains in production during 1949.

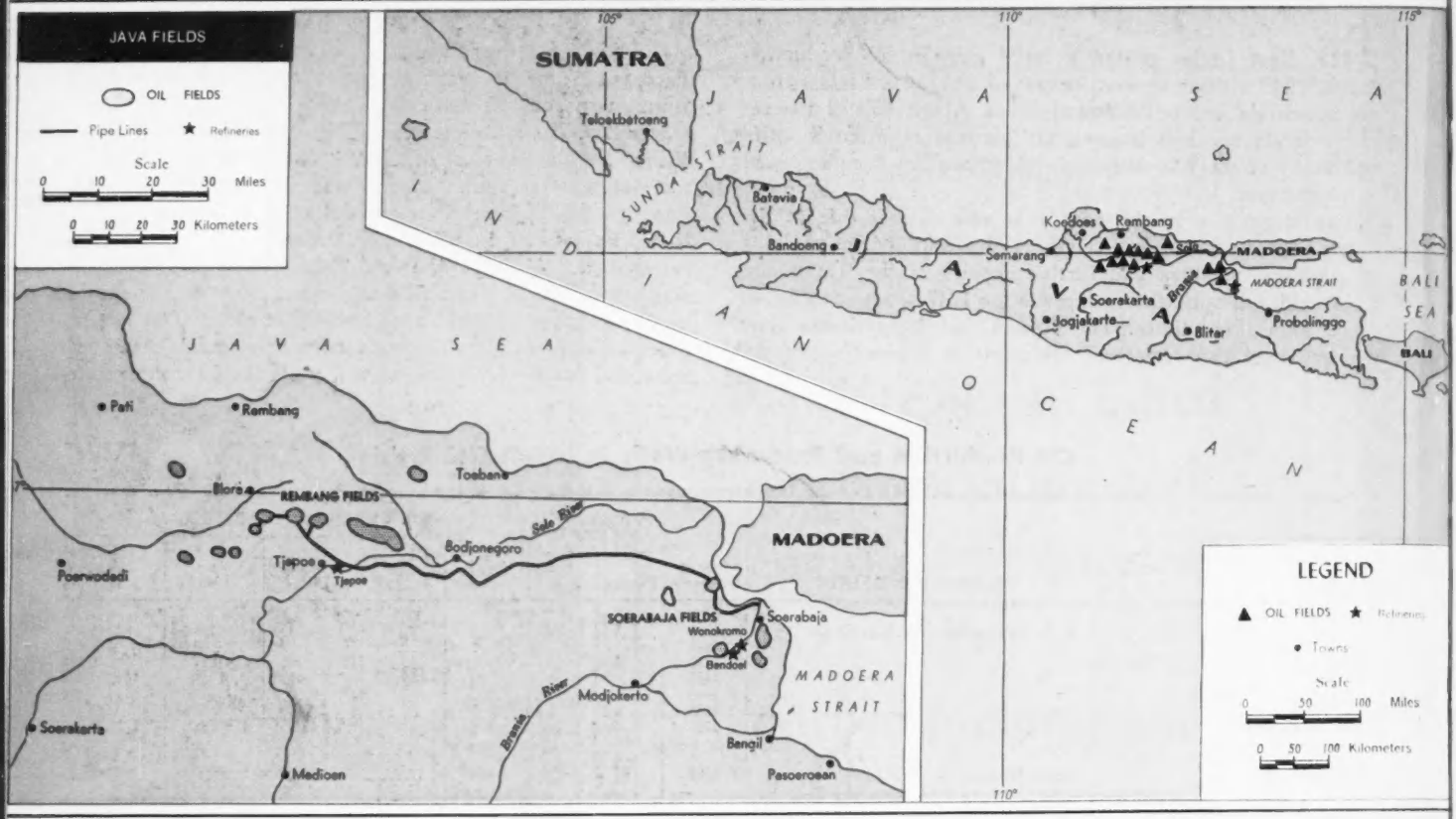
The big fields in Java and northern Sumatra are still inaccessible due to political unrest and parts of southern Sumatra are cut off from the former operators.

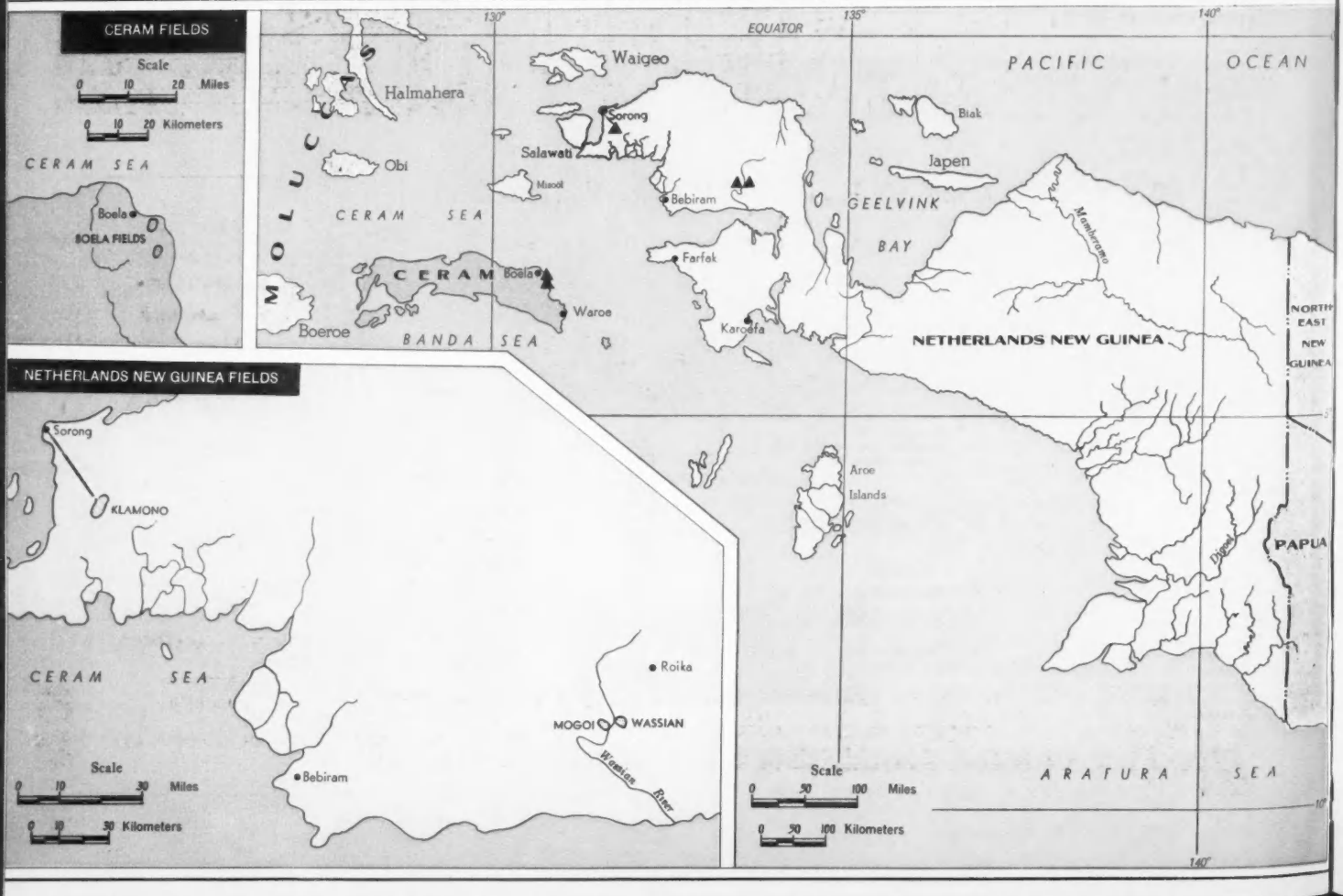
Standard-Vacuum Petroleum Mij. drilled 81 field wells during 1949 for a total of 270,920 feet and recorded 72 oil completions. Greatest activity was in the Talang Akar-Pendopo field where 49 successful completions were made. N. V. Bataafsche Petroleum Maatschappij (Shell Oil Company) drilled 47 successful field wells during the year, 14 of which were in the Seria field in Brunei. Most of the drilling in the field was to the deeper horizon at about 6000 feet. As much as 400 feet of producing section was found in the deep zone and future development will probably be concentrated

Oil Production and Producing Wells in East Indies Fields

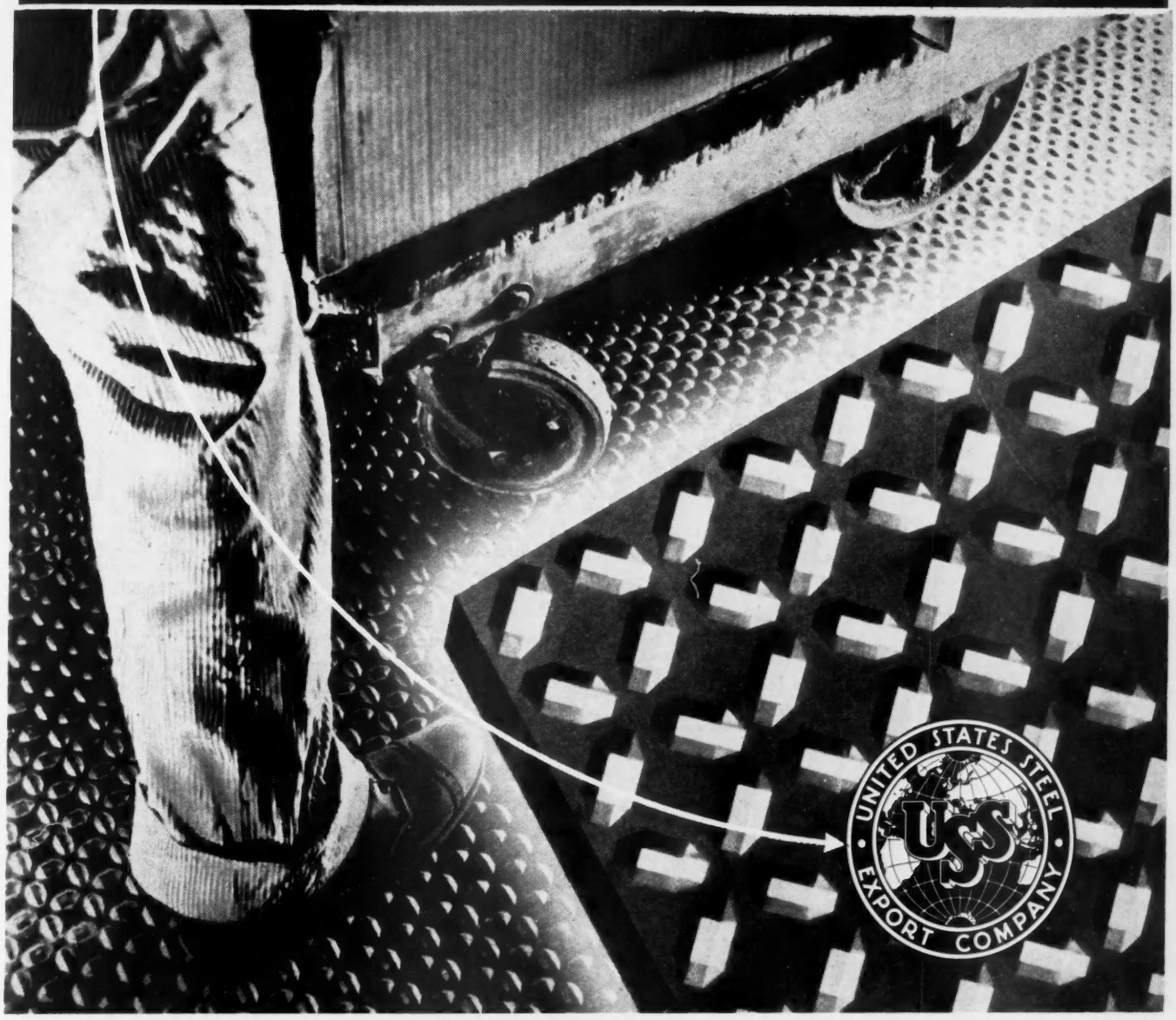
COUNTRY and FIELD	OPERATING COMPANY	Year of Discovery	PRODUCING OIL WELLS END OF 1949			CRUDE OIL PRODUCTION—(Barrels)			
			Flowing	Art. Lift	Total Producing	Daily at End of 1949	Year 1948	Year 1949	Cumulative Through 1949
BORNEO:									
Anggana-Moeara	N. V. De Bataafsche Pet. Mij. (Shell)	1902	1	92	93	4,500	1,480,000	1,465,200	61,890,200
Boenjoe		1930	....	....	....	.....	.....	.....	369,000
Sambodja		1910	1	35	36	1,440	329,000	436,100	53,519,100
Sanga Sanga		1897	....	80	80	3,860	1,299,000	1,268,000	144,603,000
Sangatta		1940	....	....	....	.....	.....	450	450
Tandjoeng		1938	1	....	1	70	77,000	73,100	422,100
Tarakan		1906	5	447	452	7,700	2,670,000	2,875,200	161,329,200
BRUNEI:									
Seria	British Malayan Pet. Co., Ltd	1929	57	93	150	75,000	18,246,000	24,696,579	106,991,579
CERAM:									
Boela-Lemoen	N. V. De Bataafsche Pet. Mij.	1897	....	....	....	.....	.....	.....	8,203,000
JAVA:									
Kawengan	N. V. De Bataafsche Pet. Mij.	1926	....	....	....	.....	.....	.....	38,972,000
Kroeka		1929	....	61	61	1,430	475,000	528,200	7,393,200
Ledok		1896	....	....	....	.....	.....	.....	21,125,000
Lidah Koelon		1896	....	....	....	.....	.....	.....	33,369,000
Loesi	N. V. Standard-Vacuum Pet. Mij.	1932	....	....	....	.....	.....	.....	505,000
Ngliron		1940	....	....	....	.....	.....	.....	10,000
Nglobo-Semanggi Banjoeasin	N. V. De Bataafsche Pet. Mij.	1897	....	....	....	.....	.....	.....	18,044,000
Petak	N. V. Standard-Vacuum Pet. Mij.	1914	....	....	....	.....	.....	.....	781,000
Tremboel		1917	....	....	....	.....	.....	.....	355,000
NETHERLANDS NEW GUINEA:									
Klamono	Nederlandsche Nieuw Guinee Pet. Mij.	1936	2	9	11	4,700	137,000	1,743,800	1,888,800
Mogei		1940	....	....	....	.....	.....	.....	459
Wasian		1940	....	....	....	.....	.....	.....	862
SARAWAK:									
Miri	Sarawak Oilfields, Ltd.	1911	....	103	103	1,180	342,000	417,761	71,248,761
SUMATRA (Northern):									
Dj Rajeu	N. V. De Bataafsche Pet. Mij.	1929	....	....	....	.....	.....	.....	559,000
Gebang		1936	....	....	....	.....	.....	.....	135,000
Pangkalan Soesoe		1917	....	....	....	.....	.....	.....	6,287,000
Pase	N. V. Standard-Vacuum Pet. Mij.	1937	....	....	....	.....	.....	.....	52,000
Perlak		1900	....	....	....	.....	.....	.....	47,870,000
Poelo Pandjang	N. V. De Bataafsche Pet. Mij.	1928	....	....	....	.....	.....	.....	11,243,000
Rantau		1929	....	....	....	.....	.....	.....	55,513,000
Serang Djaja		1926	....	....	....	.....	.....	.....	7,551,000
P. Taboehan		1937	....	....	....	.....	.....	.....	3,283,000
Telaga Said, Darat, K. Gadjah		1893	....	....	....	.....	.....	.....	23,621,000
SUMATRA (Central)									
Lirik	N. V. Standard-Vacuum Pet. Mij.	1941	....	....	....	.....	.....	.....	242,000
Oekoei		1941	....	....	....	.....	.....	.....	1,000
SUMATRA (Southern)									
Babat	N. V. De Bataafsche Pet. Mij.	1901	....	14	14	40	.....	2,180	8,138,000
Badjoebang		1927	14	5	19	3,270	.....	656,600	25,450,600
Benakat	N. V. Standard-Vacuum Pet. Mij.	1933	115	....	115	9,258	2,577,650	3,038,552	42,886,202
Betoeng	N. V. De Bataafsche Pet. Mij.	1923	....	....	....	.....	.....	.....	2,100,000
Djirak	N. V. Standard-Vacuum Pet. Mij.	1930	89	....	89	6,208	1,294,858	1,759,833	24,824,691
Goenoeng Kemala	N. V. De Bataafsche Pet. Mij.	1938	....	2	2	420	.....	30,300	352,200
Karang Ringin		1903	....	....	....	.....	.....	.....	1,572,000
Kenali Asam		1931	42	....	42	7,250	.....	2,363,500	21,567,500
Kloeang		1914	....	....	....	.....	.....	.....	27,882,000
Kruh	N. V. Standard-Vacuum Pet. Mij.	1948	9	....	9	846	51,705	231,553	283,258
Limau	N. V. De Bataafsche Pet. Mij.	1928	6	3	9	2,250	372,000	529,400	6,433,400
Mangcendjaja		1935	6	22	28	1,710	.....	229,000	10,124,650
Moeara Senami		1938	....	....	....	.....	.....	.....	93,000
Moeara Enim (Batoe Kras)		1903	....	....	....	.....	4,700	.....	28,172,000
Radja	N. V. Standard-Vacuum Pet. Mij.	1941	9	....	9	2,689	164,331	741,342	905,673
Selo		1938	....	....	....	.....	.....	.....	47,000
Soeban Boeroeng	N. V. De Bataafsche Pet. Mij.	1936	....	....	....	.....	.....	.....	6,800,000
Soeban Djerigi		1905	....	27	27	600	292,000	276,900	33,974,900
Talang Akar-Pendopo	N. V. Standard-Vacuum Pet. Mij.	1922	285	....	285	43,448	11,637,104	15,856,860	145,671,964
Talang Djimar	N. V. De Bataafsche Pet. Mij.	1937	35	2	37	17,700	8,991,000	6,468,900	40,660,900
Tandjoeng Loentar		1912	....	....	....	.....	.....	.....	4,072,000
Tandjoeng Tiga		1940	13	....	13	3,930	58,000	1,234,260	1,292,260
Tempino		1931	41	....	41	7,500	.....	2,229,900	38,296,900
Total		....	731	995	1,726	206,999	50,498,348	69,153,470	1,358,978,809

JAVA-CERAM-NETHERLANDS NEW GUINEA





STEEL FOR THE WORLD OF TOMORROW



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Install U·S·S Multigrip Floor Plate in your factory, shop, or warehouse for safe footing and safe traction . . . on floors, platforms, stairways and ramps.

Better skid resistance: Raised flat-surfaced lugs are distributed in a diagonal design to insure maximum skid resistance from any angle and give complete comfort underfoot. U·S·S Multigrip Floor Plate also provides complete and immediate drainage.

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EAST INDIES—Continued

in this section. The Seria field was one of the first recovered from the Japanese and thereby one of the first sources of oil from the Indies to be reestablished. Because of this its development has been much more rapid than before the war once the repairs had been effected.

Importance of the field to the British is enhanced by the fact that it is located in a sterling area and most of the materials for reconstruction and development come from sterling sources. The State of Brunei is now the largest crude producer in the British Commonwealth and is strategically located to better supply the markets of the Far East and Oceania than are the larger crude sources of the Middle East or Venezuela. The Miri field in Sarawak, which is also a British possession in northern Borneo, has had little drilling activity in postwar years and has lost some of its significance due to successful drilling developments at Seria.The field is still fairly important to the British, however, since it offers at present the only facilities in this area for loading oil on tankers. Sea lines extend about 2½ miles out from the shore

Refineries of the East Indies

COMPANY	Location of Plant	Crude Charging Capacity (Bbls. Daily)	Cracking Capacity (Bbls. Daily)	Daily Crude Runs End of 1949 (Bbls.)	Type of Refinery	Operating Status
BORNEO:						
N. V. de Bataafsche Pet. Mij.	Balikpapan	8,500	.....	8,500	Skimming	Operating
JAVA:						
N. V. de Bataafsche Pet. Mij.	Tjepoe	.....	.....	.....	.....	Inaccessible
	Wonokromo	1,500	.....	1,500	Skimming-Asphalt	Operating
SARAWAK:						
Sarawak Oilfields, Ltd.	Lutong	35,000	.....	35,000	Skimming	Operating
SUMATRA:						
N. V. de Bataafsche Pet. Mij.	Pladjoe	50,000	7,700	50,000	Skim.-Crk.	Operating
	P. Brandan	.....	.....	.....	.....	Inaccessible
N. V. Standard-Vacuum Pet. Mij.	Palembang	64,000	31,000	64,000	Skimming, Cracking	Operating

Engineering and Geological Data on East Indies Fields

COUNTRY and FIELD	Range of Gravity Oil (API)	Name	Kind	Age	Producing Depths (Feet)	Type of Structure
BORNEO:						
Anggana-Moeara	19–33	Balikpapan Series and Poeloe Balang	Sand	Miocene	380—3200	Anticline
Boenjoe	32, 40, 24	Sadjau Series	Sand	Pliocene	1970—3100	Anticline
Sambodja	14–34	Balikpapan Series and Poeloe Balang	Sand	Miocene	160—4400	Anticline
Sanga Sanga	18–36	Balikpapan Series and Poeloe Balang	Sand	Miocene	430—2900	Anticline
Sangatta	36	Poeloe Balang Series	Sand	Miocene	1640—4200	Anticline
Tandjoeng	40	.....	Sand, grit	Eocene	2500—4300	Anticline
Tarakan	20	Sadjau Series	Sand	Pliocene	195—2400	Anticline
BRUNEI:						
Seria	19–33	.....	Sand	Tertiary	1600—6900	Anticline
CERAM:						
Boela-Lemoen	23	Boela	Sand	Pliocene, Triassic	240— 920	Fld. Anticline
JAVA:						
Kawngan	34	Ngrajong	Sandy Limestone	Miocene	1750—2700	Anticline
Kroeka	30	Globegerinae	Limestone	Miocene	970—1600	Anticline
Ledok	43	Wonotjolo Ngrajong	Sand	Miocene	320—3200	Anticline
Lidah Koelon	24	Globegerinae	Limestone	Miocene	490—1330	Anticline
Loesi	40	.....	Sand	Tertiary	.....	.....
Ngliron	40	.....	Sand	Tertiary	.....	.....
Nglobo-Semanggi Banjoeasin	43	Wonotjolo Ngrajong	Sand	Miocene	370—3350	Anticline
Petak	40	.....	Sand	Tertiary	.....	.....
Tremboel	40	.....	Sand	Tertiary	.....	.....
NETHERLANDS NEW GUINEA:						
Klamono	19	Klasafet	Limestone	Miocene	300	Anticline
Mogoi	46	Klasafet	Limestone	Miocene	1250	Anticline
Wasian	48	Klasafet	Limestone	Miocene	2900—3225	Anticline
SARAWAK:						
Miri	21–35	.....	Sand	Tertiary	300—3050	Anticline
SUMATRA:						
Northern Sumatra:						
Dj-Rajeu	54	Seuroela	Sand	Pliocene	2520—2590	Anticline
Gebang	54	Keutapang	Sand	Miocene	2970—3480	Anticline
Pangkalan Soesoe	56	Keutapang	Sand	Miocene	1550—2100	Anticline
Paleoh Taboehan	52	Keutapang	Sand	Miocene	3300—3500	Anticline
Pase	23–30	.....	Sand	Tertiary	.....	.....
Perlak	57	Keutapang	Sand	Miocene	160—2200	Anticline
Poeloe Pandjang	55	Keutapang	Sand	Miocene	1640—2400	Anticline
Rantau	48	Keutapang	Sand	Miocene	1040—2560	Anticline
Serang Djaja	64	Keutapang	Sand	Miocene	3560—4150	Anticline
Telaga Said, Darat, K.Gadjah	51	Grenskiei	Sand	Miocene	210— 720	Anticline
Central Sumatra:						
Lirik	34	.....	Sand	Tertiary	.....	.....
Southern Sumatra:						
Babat	38	Lower Palembang	Sand	Miocene	100—1050	Anticline
Badjoebang	46	Lower Palembang	Sand	Miocene	2700—3100	Anticline
Benakat	38	.....	Sand	Tertiary	.....	.....
Betoeng	40	Lower Palembang	Sand	Miocene	180— 950	Anticline
Djirak	38	.....	Sand	Tertiary	.....	.....
Karang Ringin	42	Middle and Lower Palembang	Sand	Pliocene & Miocene	160—1200	Anticline
Kenali Asam	22–46	Lower Palembang and Upper Telissa	Sand	Miocene	1700—4100	Anticline
Kloeang	40	Lower Telissa	Sand	Miocene	2300—2600	Anticline
Limar	25	Lower Telissa	Sand	Miocene	5200—5450	Anticline
Mangoendjaja	24	Middle Palembang	Sand	Pliocene	660—2200	Anticline
Moeara Senami	48	Upper Telissa	Sand	Miocene	2400—2650	Anticline
Moeara Enim (Batoe Kras)	46	Middle and Lower Palembang	Sandy shale, sand	Pliocene & Miocene	300—1150	Anticline
Radja	40	.....	Sand	Tertiary	.....	.....
Selo	38	.....	Sand	Tertiary	.....	.....
Soeban Djerigi	46	Middle and Lower Palembang	Sandy shale, sand	Pliocene & Miocene	1300—2500	Anticline
Talang Akar-Pendopo	38	.....	Sand	Tertiary	.....	.....
Talang Djimar	28	Lower Telissa	Sand	Miocene	3600—4200	Anticline
Tandjoeng Loentar	56	Middle Palembang	Sand	Pliocene	2200—2800	Anticline
Tandjoeng Tiga	25	Lower Telissa	Sand	Miocene	4400—4600	Anticline
Tempino	48	Lower Palembang	Sand	Miocene	1930—2700	Anticline

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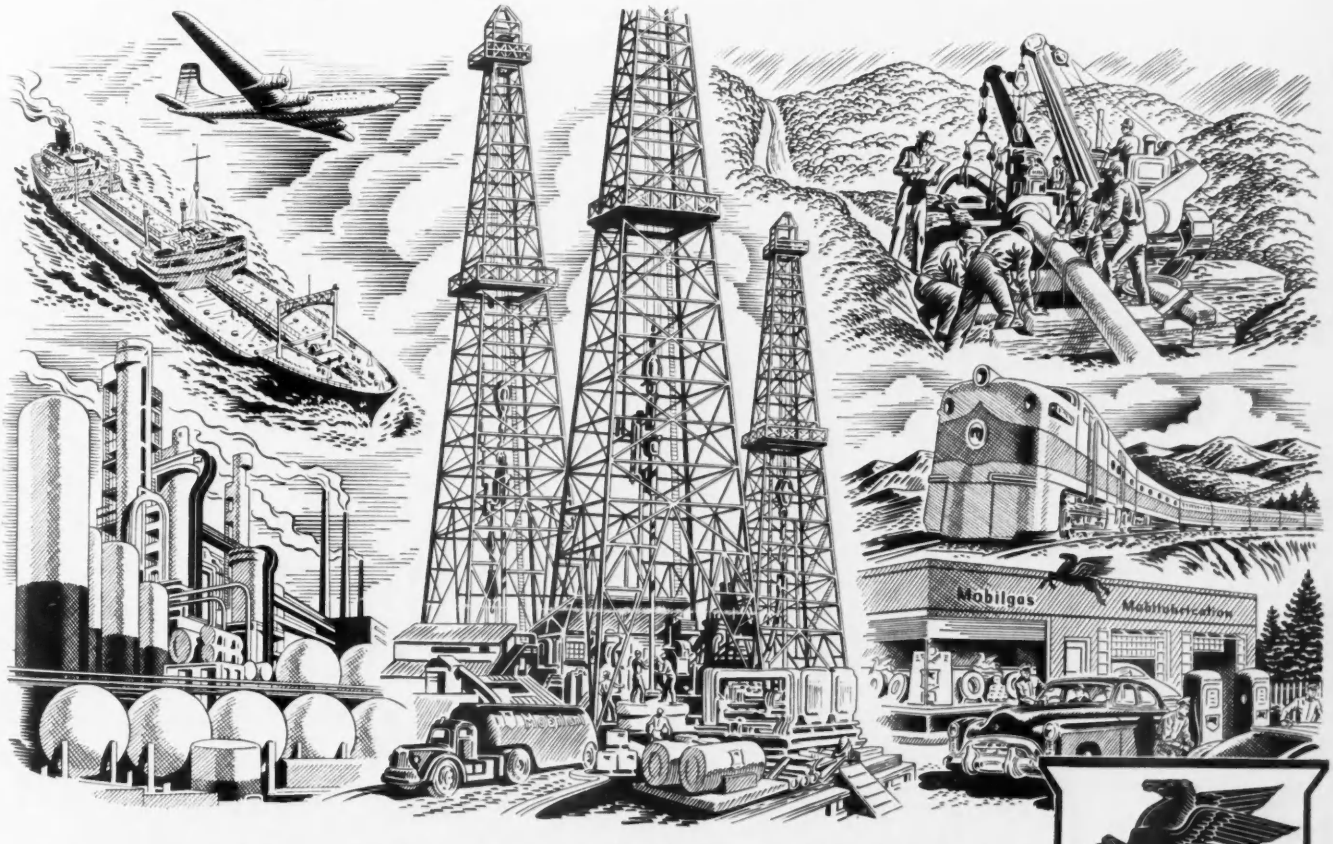

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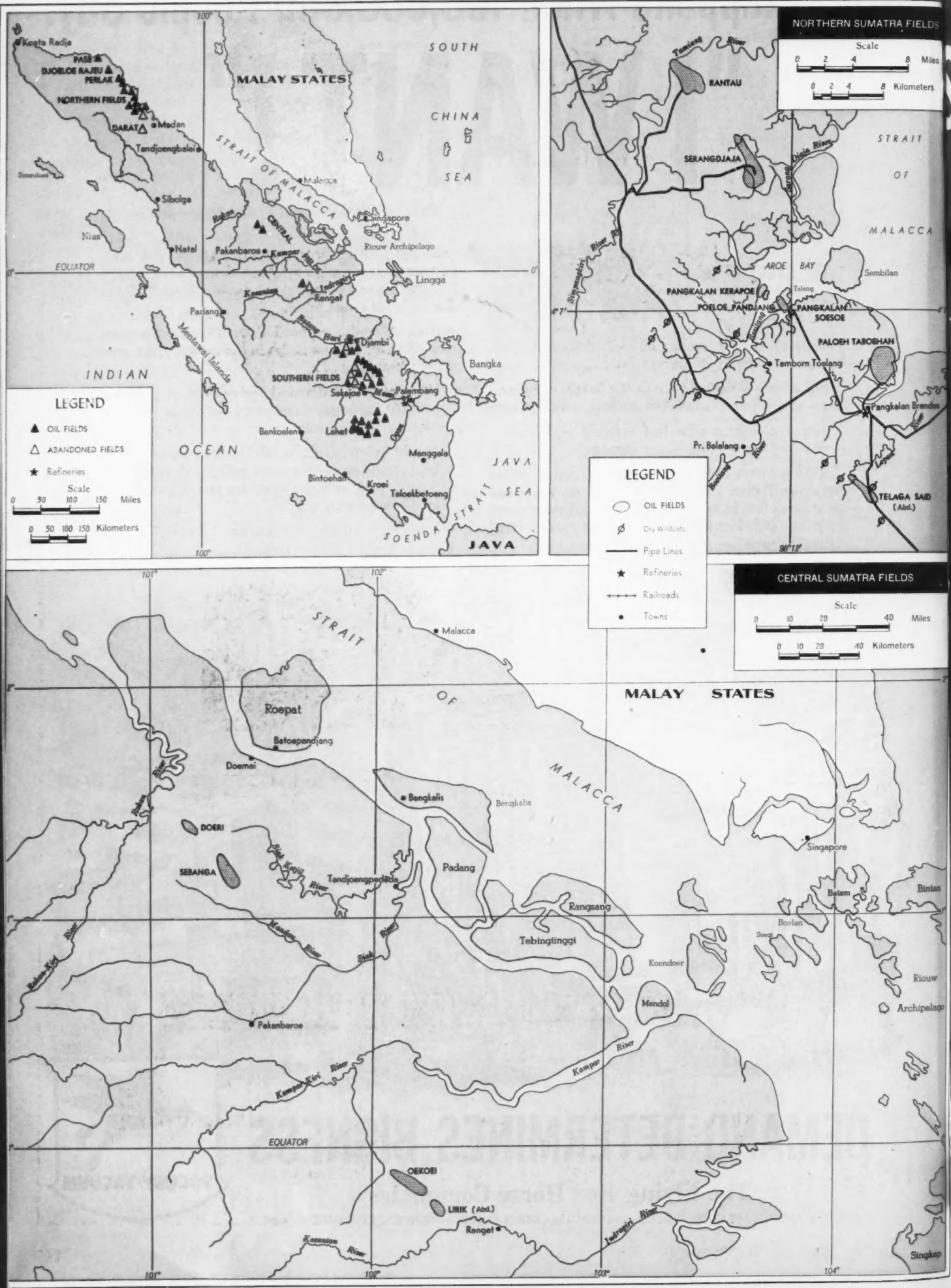
SUMATRA—Northern and Central Oil Areas



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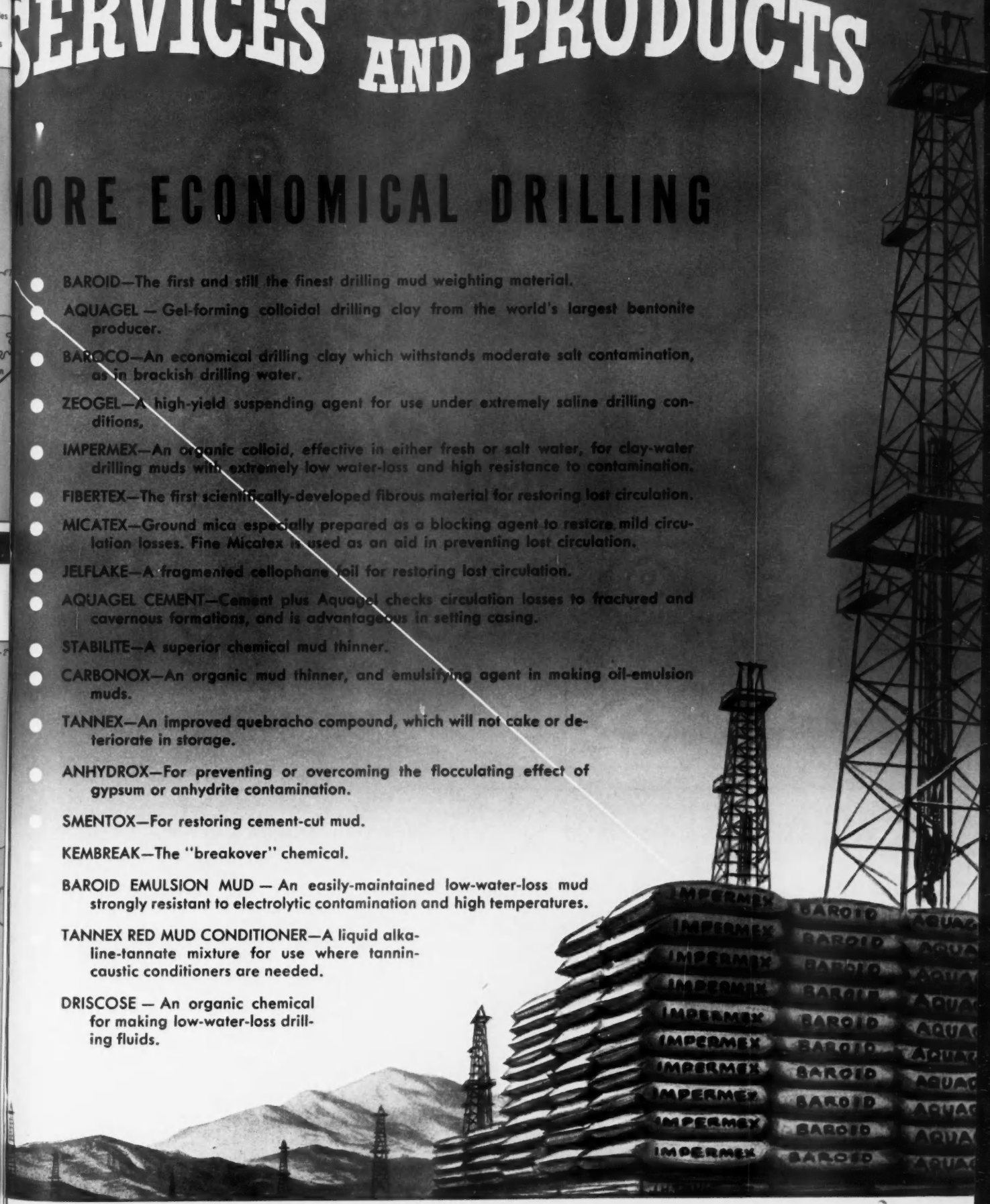
- TANNEX RED MUD CONDITIONER—A liquid alkaline-tannate mixture for use where tannin-caustic conditioners are needed.
- DRISCOSE — An organic chemical for making low-water-loss drilling fluids.



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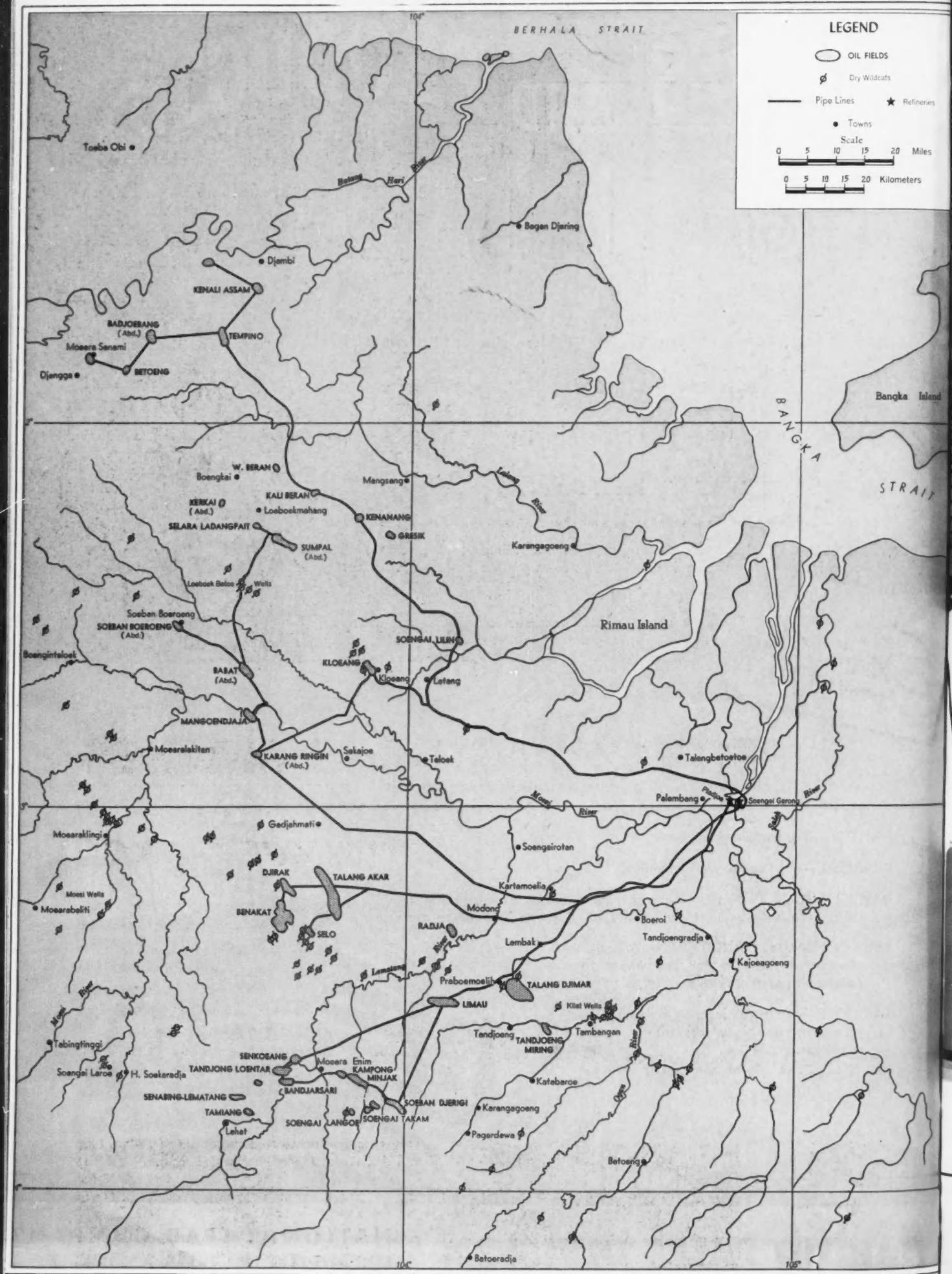
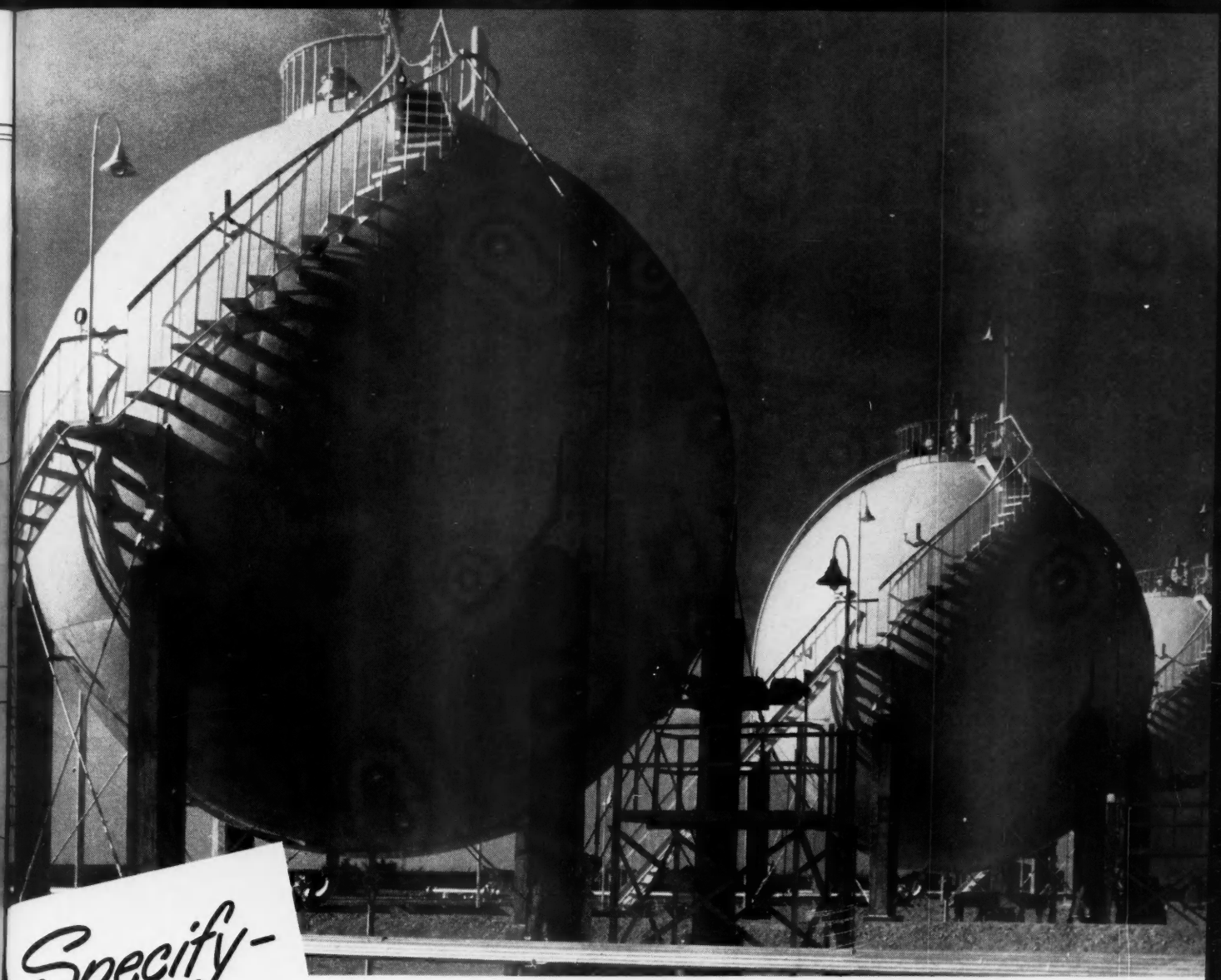
SUMATRA—Southern Oil Area





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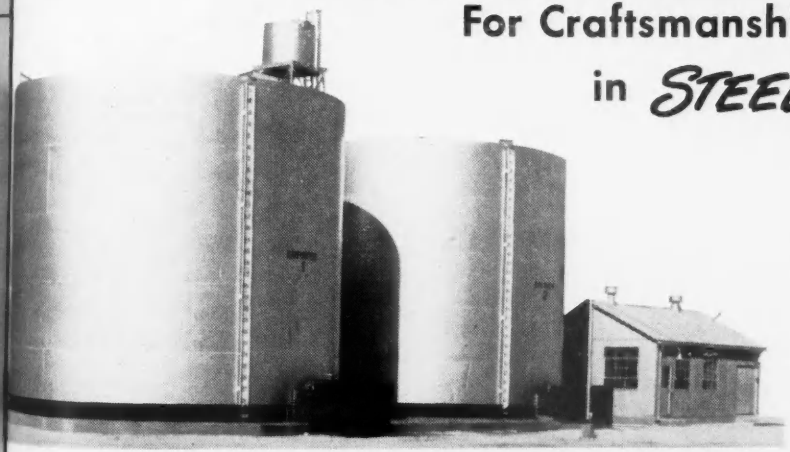

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EAST INDIES—Continued

at Miri where tankers can safely take on the load.

Oil tankers are unable to approach Seria and the oil from this field must be pumped through pipe lines to Lutong, Sarawak, where the main refinery is located. From here the refined oil is pumped a distance of about 3 to 5 miles to Miri.

The refinery situation in the Indies has not changed markedly during 1949 although the Standard-Vacuum Petroleum Mij. refinery at Kapoehn has been permanently abandoned. Some wildcat strikes and labor unrest during the year caused temporary shut downs of a few refineries but operations were normal at the close of the year.

Papua

The Australasian Petroleum Company is exploiting an 18,862-square-mile exploration concession in Papua. Two wells were drilled without results in 1948 and two more spudded in 1949 were drilling at Upoia at 2600 feet and at Hohoro at 2500 feet. The latter well was the subject of speculation over an oil strike in September, 1949.

Drilling in East Indies Fields

COUNTRY and FIELD	WELLS COMPLETED IN 1948					WELLS COMPLETED IN 1949					Wells Drilling End of 1949
				Total					Total		
	Oil	Gas	Dry	Wells	Footage	Oil	Gas	Dry	Wells	Footage	
BORNEO:											
Anggana-Moeara	1	..	..	1	1,627	1	..	..	1	273	..
Boenjoe	..	..	..	..	..	2	..	..	2	7,784	1
Sanga Sanga	3	..	..	3	4,956	..	..	..	..	..	..
Sangatta	..	..	..	..	..	1	..	..	1	4,777	1
Tandjoeng	5	..	..	5	26,104	2	..	..	2	12,880	2
Tarakan	5	..	6	11	20,555	1	..	4	5	8,770	..
BRUNEI:											
Seria	15	..	..	15	86,609	14	1	3	18	102,124	4
JAVA:											
Kroeka	..	..	2	2	4,358	..	2	..	2	4,577	..
NETHERLANDS NEW GUINEA:											
Klamono	..	..	..	..	..	2	..	..	2	1,354	..
North Klamono	..	..	2	2	3,892	..	..	..	..	..	1
Wildcats	..	..	..	..	..	..	..	1	1	3,222	4
SARAWAK:											
Miri	2	1	..	3	11,947	1	..	1	2	8,911	..
SUMATRA:											
Djirak	1	..	1	2	6,795	..	..	..	..	..	..
Goenoeng Kemala	..	..	..	..	..	1	..	..	1	6,548	1
Kruh	2	..	..	2	13,409	..	..	..	..	..	..
Limau	..	..	1	1	10,480	2	2	..	4	10,923	..
Pajakaboeng	..	..	1	1	2,516	..	..	..	..	..	..
Raja	2	..	1	3	29,197	..	..	..	..	..	..
Talang Akar-Pendopo	49	..	2	51	159,062	49	1	1	51	149,189	2
Talang Djimar	14	1	..	15	60,929	4	..	..	4	9,254	..
Tandjoeng Tiga	3	..	..	3	21,837	7	..	..	7	33,195	2
Sumatra, Miscellaneous	..	..	..	..	..	23	1	6	30	121,731	5
Wildcats	..	..	1	1	9,504	1	1	..	2	8,558	3
Total	102	2	17	121	473,777	111	8	16	135	494,070	26

AUSTRALIA

OIL exploration in Australia has been carried on intermittently for the past 50 years with no notable results. Shell Development Company climaxed a ten-year program of ground work with the announcement May 23, that the company had spudded its first deep test. The well will be drilled to 10,000 feet and is at Morella, Queensland.

The Ampol Petroleum, Ltd., largest distributor of Australian petroleum products, plans to drill in Western Australia where it holds an exploratory permit covering 200,000 square miles. The first well will be put down near the Exmouth Gulf, about 600 miles north of Perth. Depending on the results of the first test, other wells may be drilled in the Cape Range district along the North West Cape Peninsula. Surface and subsurface formations along the Rough Range near the Gulf closely resemble those of the oil fields in California and the company feels that active exploration is thoroughly justified. The vastness of Australia plus its small population leaves many large areas still unexplored.

Australia does have one oil field at Lakes Entrance, 200 miles east of Melbourne. The field was first drilled in 1924 and 44 wells have been put down. Most of the wells had shows of oil but very little production has been obtained and the field does not now produce more than ten barrels daily. In an effort to wrest commercial quantities of oil from the peculiar reservoir rock, horizontal drilling is being instituted. An estimate places the oil content of the glauconite sandstone at about 14,000 barrels per acre, but the very low gravity of the oil and the fine sand particles of the reservoir have prevented natural flow of the heavy oil.

The vast coal resources of the province of Queensland will ultimately be utilized for the production of synthetic oil products. Large quantities of coal and water are required to set up an oil extraction operation and water supply is the only obstacle in Queensland. Following the solution of the water problem, the province is expected to eventually produce enough synthetic fuel to supply the demand in Australia and possibly other parts of the British Commonwealth.

Australia now fills all of its petroleum needs from outside sources, largely from the soft currency areas. A small amount of refining is done in the country, but it only processes about 17 percent of the annual demand for petroleum products of more than 29 million barrels. About 14 percent of Australia's needs come from the U. S. in the form of refined products but the country will probably follow the British lead in reducing imports from dollar sources.

NEW ZEALAND

LATE in 1949 New Zealand reported a new oil well in the southwest part of North Island near Moturoa, New Plymouth. The well, drilled by the New Zealand Oil Refineries, was reported to have tested 140 barrels daily from 2222 feet. A second location has been staked for drilling about 3000 feet from the company's first completion. Exploratory work has been going on in the island for some time. On the basis of data obtained by geological and geophysical exploration, 13 deep tests have been drilled in various sections of New Zealand since 1938. The companies doing the work were made up largely of British and U. S. interests which ceased operations in 1944 when tests brought no encouraging results. The deepest test drilled reached 10,925 feet but no oil zones were encountered.